The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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COLLÈGE INTERNATIONAL DES CHIRURGIENS
FOUNDED BY DR. MAX THOREK

The Journal of the
International College of Surgeons
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Vol. XXIII JANUARY, 1955 No. 1

Original Articles

Management of Cancer of the Head and Neck

J. J. LONGACRE, M.D., D.A.B.S., JOHN LEICHLITER, M.D.
AND PAUL JOLLY, M.D.
CINCINNATI, OHIO

CANCER of the head and neck is easily accessible; therefore, early diagnosis followed by adequate therapy should yield a high percentage of excellent results. Unfortunately, one is confronted with a large number of patients with lingering disease who have been treated for months or years. According to Blair,[1] "It is not so much the lack of treatment or poor selection of the kind of treatment that has most handicapped the average recurrent case that we encounter today; but lack of conviction, temporizing methods and half hearted execution. It is not delayed treatment, but puttering treatment that seems to lessen the quality of our average results" (Fig. 1).

Cancer of the skin varies greatly as to pathologic picture and clinical course. The most frequent are the basal cell carcinomas, which are slow growing until they reach the mucous membrane of the nose or the conjunctiva of the eye, when they begin to spread with increasing rapidity. Some of these ultimately change over into the squamous type. Squamous cell carcinomas, arising in the chronic scurvy patches of weathered (sailor's) skin, grow more rapidly and produce local and distant metastases. "Skin appendage" adenocarcinomas grow more rapidly than do basal cell tumors and occasionally metastasize to regional nodes.

The radical attack on cancer must include not only the primary growth but the tissue secondarily involved. The majority of trained surgeons maintain that removal of the related lymphatics should be carried out in all cases of squamous cell carcinoma and adenocarcinoma.

The radiosensitivity of the tumor plays

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

the dominant role in the radiotherapeutic attack on malignant disease. Experience has shown that the basal cell tumor is not very sensitive, and when it tends to invade bone and cartilage it becomes highly resistant. MacComb[2] stated that in none of 44 cases of basal cell epithelioma treated by single doses of low voltage roentgen therapy did satisfactory regression occur with less than 12.5 threshold erythema doses. According to Pack and Livingston,[3] the average squamous carcinoma of the skin is a relatively resistant tumor, though its curability is high provided the treatment is intensive (8 T.E.D.). When squamous carcinoma develops on the basis of preexisting cutaneous damage, e.g., fibrotic burn scars, chronic radiation dermatitis or lupus, the radioresistance is increased. Thus, if the lesion is to be destroyed, sufficient irradiation must be given to destroy in part the surrounding normal tissues, which frequently requires later block excision of the ulcer and reconstruction with flaps (Fig. 2). Pierce, Klabunde and Brobst[4] expressed the conviction that "if the first irradiation fails to eradicate the tumor, if there is a recurrence only surgery should be done and at once."

[illegible] carcinoma of [illegible] irradiation.

In 1928 von Imre[5] published his classic work, carefully illustrating his technic of block excision of malignant tumors of the face, followed immediately by reconstruction with local tissues. In 1940, Pack and Livingston[6] recognized the shortcomings of irradiation in the treatment of certain lesions and advised operation followed by plastic repair for recurrent skin cancers and for carcinoma arising in atrophic skin, burn scars, lupus, roentgen dermatitis and sebaceous cysts. Kraisse and Conway[7] recently have emphasized block excision of small tumors of the face with reference to the wrinkle lines. Kleitsch[8] has advocated excisional biopsy followed by reconstruction with local tissues.

The chemosurgical technic devised by Mohs[9] and recently reported by Szujewski[10] allows for the accurate removal of externally accessible neoplasms. The three steps of fixation, excision and microscopic examination are repeated again and again until there is no evidence of tumor in the sections. After a sufficient interval of time has passed with no evidence of recurrence, the resulting deformity may be corrected (Fig. 3).

This same careful microscopic check of the extirpation of the lesion can be carried out at the time of radical operation by means of a careful frozen section technic. The thoroughness of ablation and, hence, the chance of cure rest particularly on the competence and experience of the pathologist as well as the surgeon.

The function of the pathologist is to assist the surgeon in determining when all neoplasm has been removed and only normal tissues remain. No new or original

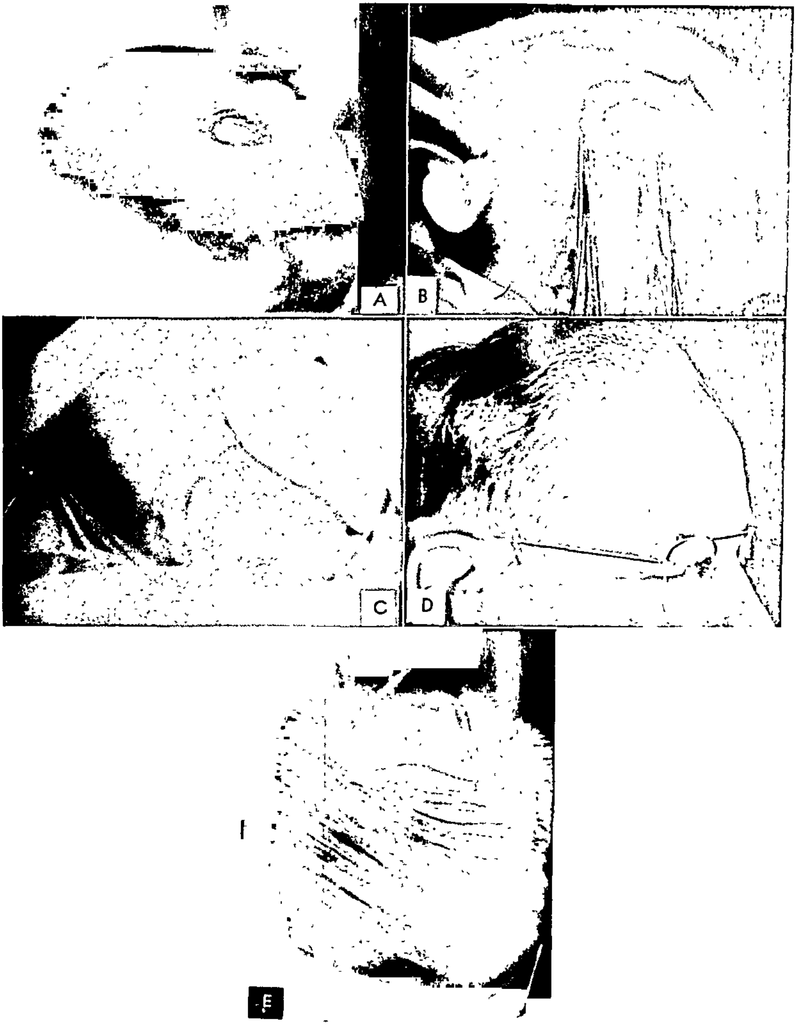

Fig. 2.—*A*, extensive ulceration and epilation of scalp following cure of small carcinoma in temporal region. *B*, lesion has been excised *en bloc.* Dead eburnated outer table of skull [illegible] about to be removed. *C, defect over temporal and parietal bones has been reconst* [illegible] *th* [illegible] *e rotatio* [illegible] *a* of scalp. The denuded pericranium will be covered with a split graf [illegible] pa [illegible] years after reconstruction of the defect. *E*, sagittal view, showing t [illegible] f

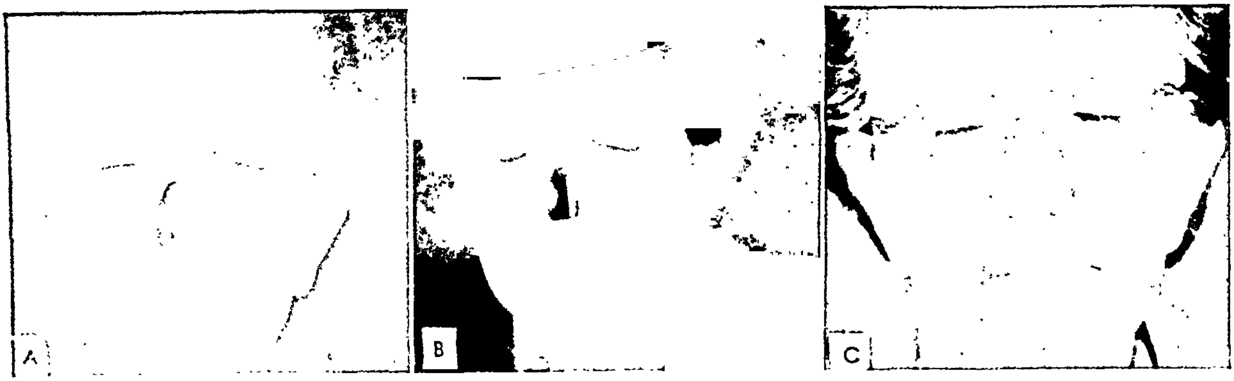

Fig. 3.—*A*, extensive defect of upper lip and nose six years after cure of carcinoma of the nose with Escharotic paste. There is a through-and-through fistula between the mouth and nose. *B*, view after reconstruction of upper lip with Estlander-Abbe flap. *C*, view with prosthetic nose in place. Patient has great difficulty keeping the nose in place, so that she wears it only when she goes marketing or to church.

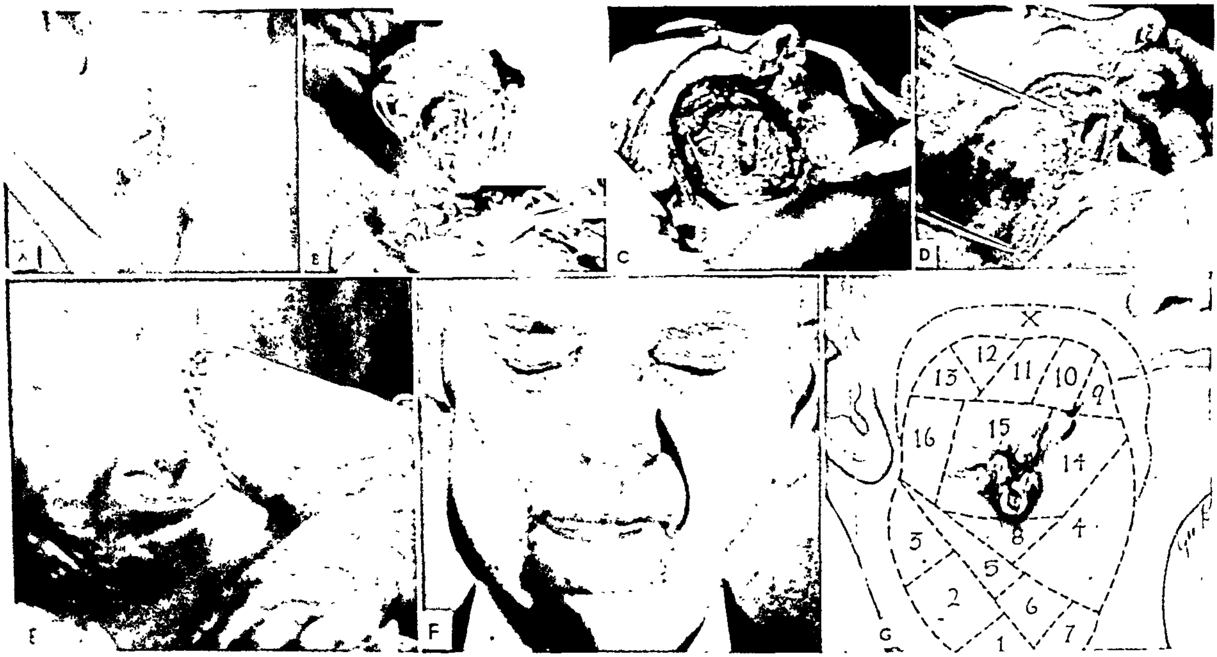

Fig. 4.—*A*, squamous carcinoma (Grade II) involving full thickness of cheek and mandible. Tumor has continued to spread despite intensive irradiation (roentgen and radium) by an excellent roentgenologist. There is no evidence of distant metastasis. *B*, patient eight days after radical block dissection of neck in continuity with ablation of entire right side of face up to base of skull because of involvement of the pterygoid, masseter and buccinator muscles. Right mandible resected along with [illegible] of mouth and lateral third of both upper and lower lips. Thirty-five sections taken on the margins found to be free of malignant disease. Orbicularis function preserved by suturing the remaining portions of the lips. Entire denuded area immediately covered with split graft dressing after thorough cleansing of the wound with saline solution. Elective tracheotomy performed. Note [illegible] of split graft dressing. *C*, all edges have been carefully checked for evidence of [illegible] starting of reconstruction. *D*, reconstruction in progress, with use of lined jump flap from the left arm. *E*, jump flap has been completely sutured in place. *F*, view of patient [illegible] after completion of facial reconstruction. No evidence of recurrence. Patient is working daily as a Diesel engineer.

[illegible] utilized. The only requirement [illegible] collaboration with the [illegible] painstaking examination of frozen sections. The first step is a consultation between the surgeon and the pathologist, with a review of the past history. If original slides of biopsy or other material are available, they are reexamined and the pathologic diagnosis confirmed.

A large preliminary sketch (Figs. 4*G* and 5*F*) is made of the lesion "in situ," with proper orientation as to anatomic landmarks. The projected surgical excision is planned and is outlined with methylene blue. This area is also mapped by the pathologist on his preliminary sketch. The surgeon excises along these markings, taking care that excised specimens are properly oriented by a clamp or small suture. The specimen is pinned to a cutting board in the laboratory with

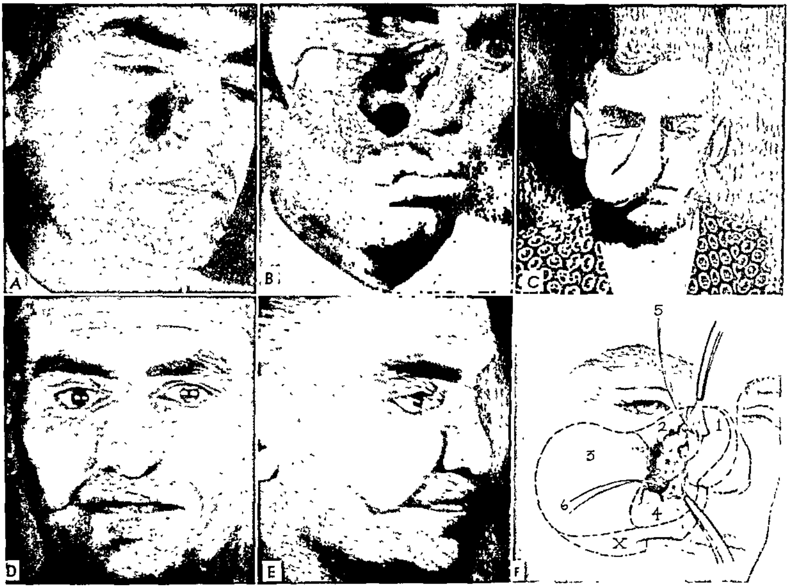

Fig. 5.—*A*, recurrent squamous cell carcinoma, Grade II, of many years' duration, which has been treated with radium and repeated series of roentgen therapy. Patient has become chronically alcoholic and has been abandoned by his family. He is now under the care of the Welfare Department. *B*, no evidence of recurrence six months after radical ablation of the lesion, a radical block dissection of the entire right cheek, a good portion of the left lower eyelid and the entire inner canthal region, the right half of the nose and greater portion of the right lip was resected. After this, the entire anterior three-fourths of the right maxilla was resected, including the nasal spine. The anterior ethmoid air cells and the greater portion of the cartilaginous and bony septum had to be resected. Fifteen frozen sections were taken. These revealed the dissection to be wide of the lesion. Subsequently the lip was reconstructed to preserve the orbicularis function. The wound was thoroughly irrigated with large [illegible] of saline solution. The entire area was covered with a split graft removed from the left [illegible] been reconstructed with pancake portion of thoraco-abdominal tube pe[illegible]ion of the tube has been brought up to start the nasal reconstruction. *L*, [illegible] r years after ablation of the lesion followed by reconstruction with a [illegible] defect of the palate was closed with a prosthesis. *E*, lateral view of pati[illegible] of lesion. There is no evidence of recurrence. Patient is very happy and profitably employed.

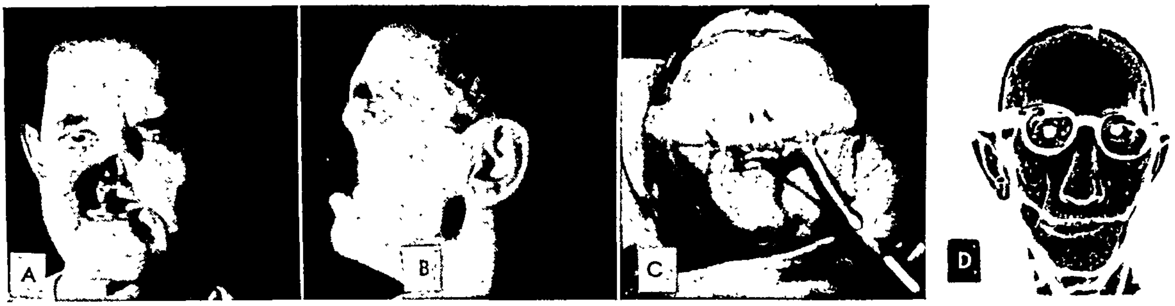

Fig. 6.—*A*, view of patient one year after extirpation of both maxillae and nose for recurrent malignant disease. Biopsies taken at this time revealed no evidence of recurrence. *B*, lateral view of patient one year after radical resection. *C*, reconstruction of middle third of face. A lined visor flap was used over a prosthesis. *D*, view four years after reconstruction of middle third of face. Patient is extremely unhappy with the rapid change in color of sixth prosthetic nose during the past year. He requests that a nose be made of his own tissue.

orientation maintained. Normally, a small block is removed from the actual lesion, usually in the center, and frozen sections are prepared for verification of the presence of tumor. In succession, cleanly cut sections are removed in a planned fashion from the borders of the specimen. Care is taken to maintain orientation of the slices so that the outermost portions of the specimen are sectioned for examination. This process is repeated around the borders, each portion chosen being identified by a serial number or letter on the sketch (Figs. 4*A* and 5*A*), and his number accompanies the slides as they are prepared. Should there be microscopic evidence of tumor cells, the surgeon is informed and carries out further ablation (Figs. 4*AX* and 5*AX*) until all tissue is free of tumor. In 1 instance 38 different sections were made and studied before the extirpation was considered complete. It is not unusual to consume two large tanks of carbon dioxide for the freezing process in a single case.

When the surgeon is assured by the pathologist that the entire lesion has been ablated, the wound is irrigated with liters of saline solution, and the instruments, gloves and drapes are changed. The denuded area is then covered with a split skin dressing, which quickly converts the wound into a healed wound free of granulation, through which one can easily observe for the possibility of recurrence (Figs. 4*B* and 5*B*).

Once the lesion has been excised, it should be observed for six months to a year for the possibility of recurrence. It has been noted, however, that, though the lesion is arrested and there is a possibility of a cure, massive ablation of lesions about the head and face is followed by a profound psychic depression on the part of the patient. Since these areas are constantly subjected to public gaze, the patient becomes more retiring and introvertive and eventually seems to withdraw into his own shell, frequently taking liquor to excess or even contemplating suicide. This is true especially when members of his own family seem to shun and avoid

Summary of Follow-up in 107 Cases of Cancer Treated by Radical Controlled Ablation

Patients free from recurrence	95, or 88.7%
5-8 years after operation	36, or 33.6%
3-4 years after operation	45, or 42.0%
2 years after operation	14, or 13.0%
Patients with recurrence	6, or 4.6%*
Postoperative surgical deaths	0
Deaths due to other factors	6**

*Of these, 2 died of generalized metastasis; 1 is dying of metastasis; in 2 the cancer was arrested by block excision and in 1 it was arrested by irradiation.

**Patients were free from metastasis at the time of death. 4 deaths were due to cardiovascular disease with coronary occlusion. There were 2 suicides six days and three years, respectively, after the operation.

him. In patients who are hospitalized, with extensive resection of the mandible, maxilla, tongue and cheek and with the associated difficulty in speaking and eating, the problem becomes particularly acute. This is a type of psychic disturbance that no sedative, shock therapy or psychoanalysis will clear up, because it is a somatopsychic problem. The only thing that tends to tide the patient over the interval is the hope that some day, in the not too distant future, his somatic deformity will be corrected. Positive assurance to the patient is afforded by starting the reconstruction at a distance from the original resection. After the time interval has elapsed and there is no evidence of recurrence, all of the edges of the defect are excised (Fig. 4*C*) and thoroughly checked with microscopic sections before the reconstruction is begun (Figs. 4*D* and *E*, 5*C*). When the reconstruction is completed (Figs. 4*E* and 5*D*, *E*) the patient is rehabilitated and anxious to return to work.

Frequently a well made prosthesis will aid the patient during the interval. The only difficulty is that it is hard to obtain a nonirritating paste and one that will hold the prosthesis accurately in place for more than a few minutes when subjected to the muscular movements of the remaining parts of the face, the mucous from the nose and mouth and the moisture when the patient is caught in the rain. It requires only a few episodes of loosening of the prosthesis in public to send the patient back to the plastic surgeon, demanding that something be done. The rapid deterioration and change in color of the vinyl acrylic prosthesis is also to be taken into account. We have had 1 patient who obtained six different prosthetic noses within less than a year, only to have the last change color so rapidly that he would rather wear a dressing than put on the prosthesis. As a result, he has demanded a nose "made of living flesh," even though he was warned that it will never have as perfect a contour as has the newly constructed prosthesis (Fig. 6).

SUMMARY

In our follow-up of a series of 107 cases of carcinoma of the head and neck (in over 60 per cent of which there had been recurrence after previous therapy, including excision, fulguration, roentgen therapy and radium) and in which meticulous radical surgical ablation (controlled by microscopic frozen section) was carried out over an eight-year period, certain facts have been self evident:

1. The incidence of recurrence is low (4.6 per cent). There have been 2 recurrences in the group with nasal carcinoma, 1 of which was controlled by a minor excision and the other by radium. There were 3 recurrences of squamous carcinoma of the ear, 2 of the patients dying of metastasis. One patient with carcinoma of the face and neck is dying of carcinomatosis three years after completion of his reconstruction. The patient has been gainfully employed and happy for three years. Four patients in the group have subsequently died of cardiovascular disease two to three years after the operation. Two patients committed suicide in the early part of the series.

2. Initial split-skin dressing or full thickness graft provided a healed wound, in which it was possible to check for recurrence.

3. The morale of the patient was heightened by presenting to him at the time of consultation a plan for ultimate reconstruction, after an interval following radical ablation of his lesion. This provided him the thread of hope so necessary during the interval of waiting.

4. In the most [illegible] resections (third to one-half [illegible]

stage of the reconstruction was started after a shorter interval at a distance from the original resection to provide tangible evidence of eventual restoration, thereby, giving the patient more than a thread of hope (Figs. 4 and 5).

5. Reconstruction should be so planned that the best possible functional as well as cosmetic result is obtained with the minimum of stages and of consequent hospitalization. In certain instances it is possible to complete the reconstruction in one stage, in two stages or in many stages.

6. As the reconstruction proceeds, there is a resurgence of the spirit and psychic status of the patient. When the reconstruction is completed, the patient is eager to resume his role as an effective worker. When he is back on the job and has fitted into his niche in relation to his environment, he has attained the maximum amount of rehabilitation.

RÉSUMÉ

Nous avons suivi pendant huit ans une série de 107 cas de carcinomes de la tête et de la nuque, dont 60% présentaient une récidive après traitement (excision, fulguration, roentgenthérapie et radiothérapie). Soulignons que l'ablation chirurgicale avait été pratiquée avec le plus grand soin (contrôle microscopique). Nous pouvons faire les remarques suivantes:

1. La fréquence de récidive est faible (4,6%). Il y a eu 2 récidives dans les carcinomes du nez, dont l'une a pu être jugulée par une excision minime, l'autre guérie par le radium. Il y a eu 3 récidives de carcinome de l'oreille: 2 des malades sont décédés par suite de métastases. Un malade avec carcinome de la face et de la nuque est mort de carcinomatose trois ans aprés la fin des opérations plastiques., pendant lesquels il a pu mener une vie normale. Quatre malades du groupe sont décédés de maladie cardiovasculaire deux ou trois ans après l'opération. Deux malades se sont suicidés au début de la période d'observation.

2. Un pansement initial de split-skin, ou une greffe étoffée ont permis d'obtenir une bonne cicatrice, dans laquelle il a été possible de constater l'absence de récidive.

3. Le moral des malades a été soutenu par le fait qu'on leur présentait au moment de la consultation le plan des opérations projetées. Cela lui donnait l'espoir si nécessaire durant la période d'attente.

4. Dans les résections les plus larges (un tiers jusqu'à la moitié de la face), le premier stade de la plastique était rapproché le plus possible de la résection tumorale afin de donner au malade une preuve tangible de la plastique restauratrice.

5. Le plan opératoire doit être abrégé au maximum.

6. Au fur et à mesure des opérations plastiques le moral du malade s'améliore et il est impatient de reprendre une vie normale.

RIASSUNTO

E' stata fatta una revisione di 107 carcinomi del capo e del collo, il 60% dei quali trattati una prima volta con escissione, folgorazione, roentgen e radiumterapia, e poi recidivati e sottoposti (entro un periodo di otto anni) a terapia chirurgica radicale e meticolosa, con controllo microscopico su sezioni congelate.

Le conclusioni sono le seguenti:

1. La frequenza delle recidive è bassa (4,6%). Vi furono due recidive di carcinomi del naso, trattate l'una con un reintervento e l'altra col radium. Altre 3 recidive di carcinomi malpighiani dell'occhio, con 2 morti per metastasi. Un paziente con un cancro della faccia morì per disseminazione del tumore dopo 3 anni di benessere; altri 4 morirono per affezioni cardiovascolari da 3 a 4 anni dopo l'intervento, e 2 si suicidarono.

2. Le ferite furono colmate con trapian-

ti cutanei a lembo o a tutto spessore.

3. Il paziente fu sostenuto moralmente sopratutto nel periodo intercorrente fra l'asportazione radicale della lesione e l'inizio della fase di ricostruzione.

4. Nei casi in cui la resezione fu molto estesa (da un terzo fino a una metà della faccia) la ricostruzione plastica fu iniziata dopo un periodo breve, così da fornire al paziente una prova tangibile dei risultati che si sarebbero ottenuti alla fine della cura.

5. Il programma per la ricostruzione deve essere fatto in modo da conseguire i migliori cosmetici a funzionali ron il numero minore di atti chirurgici e la più breve degenza. I tempi possono essere uno, due o più.

6. Quanto più si progredisce nella ricostruzione tanto più si conforta il morale del paziente, cosicchè alla fine egli è in grado di riprendere un lavoro proficuo e *può considerarsi veramente riabilitato.*

RESUMEN

En una serie de 107 casos de carcinoma de la cabeza y cuello, con 60 por ciento de recidiva después de terapeútica previa, consistente en extirpación, fulguración, roentgenoterapia y radio, se observaron ciertos hechos durante un período de 8 años después de la extirpación quirúrgica que se controló por cortes por congelación.

1. La incidencia de recidiva es baja (4.6 por ciento), presentándose 2 recidivas en el grupo con carcinoma nasal, una de as cuales fué controlada por extirpación menor y la otra por el radium. Se presentaron 3 recidivas de carcinoma espinocelular de la oreja, mariéndo 2 de los pacientes a consecuencia de las metástasis. Un paciente con carcinoma de la cara y cuello se encuentra muriendo de carcinomatosis tres años después de su reconstrucción. El paciente ha trabajado y ha sido feliz durante tres años. Cuatro pacientes del grupo han muerto a consecuencia de enfermedad cardiovascular, dos o tres años después de la operación. Dos pacientes se suicidaron desde un principio.

2. El apósito inicial de piel o el injerto total de la misma proporcionaron una cicatrización de la herida, en la que fué posible controlar la recidiva.

3. La moral del paciente fué levantada *por la presentación durante la consulta de* un plan de reconstrucción de su lesión después de un intervalo consecutivo a la extipación quirúrgica de la misma. Esto le proporcionó la esperanza necesaria para el tiempo de espera.

4. En las extirpaciones más extensas (de un tercio a un medio de la cara), se empezó el primer estadío de la reconstrucción después de un corto intervalo de la extirpación original, para proporcionar la *evidencia tangible de la restauración, dándose* por consiguiente al paciente más que una esperanza.

5. La reconstrucción debe planearse en tal forma que se obtenga el mejor resultado cosmético y funcional con el mínimo de tiemps operatorios y por consiguiente de hospitalización. En ciertos casos es posible el completar la reconstrucción en un tiempo, en dos tiemps o en muchos tiempos.

6. Conforme se realiza la reconstrucción se restablece el estado psíquico y cuando se completa el paciente tiene ánimo para desarrollar su papel como un trabajador eficiente. Cuando regresa al trabajo y se *ha colocado adecuadamente en relación con* el ambiente, ha logrado el mayor grado de rehabilitación.

SUMARIO

O acompanhamento feito pelo autor de 107 casos de carcinoma da cabeça e pescoço, em mais de 60% dos quais houvera recidiva após tratame [illegible] o ante
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radiumterapia e nos quais a ablação cirúrgica radical e meticulosa (com controle microscópico após congelação) foi levada a efeito durante um período de 8 anos, se presta a observações de interêsse:

1. A incidência de recidiva é baixa (4,6%). Houve 2 recidivas no grupo com carcinoma nasal, uma das quais foi controlada por extirpação e a outra por radiumterapia. Houve 3 recidivas de carcinoma escamoso do pavilhão auricular, sendo que 2 dêsses pacientes faleceram com metastases. Um paciente com carcinoma da face e pescoço está moribundo, com carcinomatose, três anos após o término de sua reconstrução, embora tenha estado empregado e bem durante três anos. Quatro pacientes neste grupo faleceram subseqüentemente devido a afecções cárdio-vasculares, dois a três anos após a operação. Dois pacientes suicidaram-se na primeira parte desta série.

2. O revestimento cutâneo inicial ou o enxerto de espessura total conferem uma ferida cicatrizada, na qual foi possível controler possíveis recidivas.

3. A moral dos pacientes é mantida elevada pela apresentação aos mesmos, por ocasião da consulta, de um plano para reconstrução final, após um intervalo subseqüente à extirpação radical da lesão. Mantem-se assim sua esperança, tão necessária durante o período de espera.

4. Nas ressecções mais extensas (⅓ a ½ da ace), iniciou-se a primeira etapa da reconstrução mais precocemente, a uma certa distância da região original da ressecção, com o fito de fornecer ao paciente uma prova palpável da reconstrução a ser feita, aumentando-se assium sua esperança.

5. A reconstrução deve ser planejada de maneira tal a produzir os melhores resultados, não só funcionais como cosméticos, com o mínimo de operações e consequentes hospitalizações. Em alguns casos é possível completar-se a reconstrução em duas ou várias sessões operatórias.

6. A medida que a reconstrução progride melhora o estado de espírito do paciente, o qual anciosamente deseja retomar sua posição na comunidade ao término da mesma. O paciente atinge o máximo de reabilitação quando novamente de posse de um emprego e em relação normal com o meio ambiente.

ZUSAMMENFASSUNG

Die Verfasser berichten über eine Serie von 107 Fällen von Krebsen des Kopfes und Halses, unter denen 60 Prozent Rückfälle nach vorangegangener Behandlung mit Exzision, Fulguration, Röntgen—und Radiumbestrahlung zu verzeichnen waren, und in denen innerhalb eines Zeitraumes von acht Jahren radikale chirurgische Abtragungen unter mikroskopischer Kontrolle an Gefrierschnitten ausgeführt wurden. Die Nachuntersuchungen führen zu den folgenden Schlüssen:

1. Die Anzahl von Rückfällen ist gering (4,6%). Bei zwei rückfälligen Kranken dieser Gruppe handelte es sich um einen Nasenkrebs, von denen einer mittels einer kleinen Exzision und der andere mit Hilfe von Radium zum Stillstand gebracht werden konnte. Unter den Plattenepithelkrebsen des Ohres gab es drei Rückfälle, von denen zwei zum Tode durch Metastasen führten. Ein Patient mit Krebs des Gesichts und des Halses liegt im Sterben infolge einer drei Jahre nach Beendigung seiner Wiederherstellung aufgetretenen Karzinomatose. Dieser Kranke fühlte sich drei Jahre lang wohl und konnte während dieser Zeit seinen Lebensunterhalt als Angestellter verdienen. Vier Kranke der Serie starben zwei bis drei Jahre nach der Operation an Erkrankungen des Herz-Gefäbsystems. Zwei Patienten aus dem frühen Zeitabschnitt der Serie verübten Selbstmord.

2. Die erste Deckung des Defekts mit gespaltenem oder vollem Hauttransplantat

führte zu einer völlig heilenden Wunde, innerhalb deren das Suchen nach Rückfällen leicht ausführbar war.

3. Dadurch dass den Kranken bei der ersten Beratung ein Plan vorgelegt wurde, der nach einem gewissen der radikalen Abtragung des Krankheitsherdes folgenden Zeitraum eine endgültige Wiederherstellung voraussah, konnte man ihre Stimmung und ihren Mut aufrecht erhalten. Dieser Hoffnungsstrahl ist für das Durchhalten der Warteperiode von grosser Wichtigkeit.

4. In den Fällen, die äusserst umfangreiche Resektionen erforderten (ein Drittel oder eine Hälfte des Gesichts), wurde der Zeitraum bis zur ersten Sitzung des plastischen Wiederaufbaus in der Nähe Des ursprünglichen Resektionsfelds abgekürzt, um dem Kranken ein greifbares Beispiel des endgültigen Wiederherstellungsprozesses zu geben und damit seinen Mut und seine Hoffnungen zu erhöhen.

5. Die Planung der Wiederherstellung soll darauf gerichtet sein, die bestmöglichen funktionellen und kosmetischen Ergebnisse mit einer Mindestzahl von chirurgischen Sitzungen und den darauf folgenden Krankenhausaufnahmen zu erzielen. Je nach Lage der Fälle wird sich die völlige Wiederherstellung in einer, in zwei oder in vielen Sitzungen erreichen lassen.

6. Mit fortschreitender Wiederherstellung lässt sich die Wiederbelebung der Stimmung des Kranken beobachten. Am Ende der Behandlung dringt er darauf, seine beruflichen Funktionen wieder zu übernehmen. Das höchste Ziel der Rehabilitation ist erreicht, wenn er sich völlig wieder in seine Berufsaufgaben und in seine Umgebung eingelebt hat.

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Man is continually saying to woman, Why will you not be more wise? Woman is continually saying to man, Why will you not be more loving? It is not in their wills to be wise or to be loving; but unless each is both wise and loving, there can be neither wisdom nor love.

—*Thoreau*

The Disadvantages of Thorotrast

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THE use of substances opaque to roentgen rays is sometimes indispensable to the establishment of a diagnosis. Thorotrast has been and still is much employed, for it is apparently well tolerated and produces perfect roentgen negatives.

Is it really so well tolerated? Personal experiments as well as clinical results prove that it is not.

Personal Experiment. — Two roentgen films were used. On the first one, 3 ampules of distilled water were placed for thirty-five days; on the second, 3 ampules of Thorotrast were placed for the same length of time. Nothing was seen on the first film, but the second film showed deep radioactive traces (Fig. 1).

Clinical Results: CASE 1.—A woman aged 29 complained of pains in the right kidney. A urologist performed a pyelographic study early in 1940. Ptosis of the right kidney was discovered. Nephropexy was performed, and the patient recovered.

In January 1943, two days after a bicycle accident, the patient noticed pains in the left kidney. She was referred to the surgical department of this hospital on July 29. Roentgenograms were taken, and the negatives revealed spots representing residuals of the Thorotrast injected three years earlier (Fig. 2).

Conservative therapy (diathermy, infra-red irradiation, massage in the region of both kidneys and the use of urinary disinfectants) was given. A cystoscopy was done, with separation of the urine and seeding of the urine on Loewenstein. An ascending pyelogram taken with Roche's contrast filter showed the

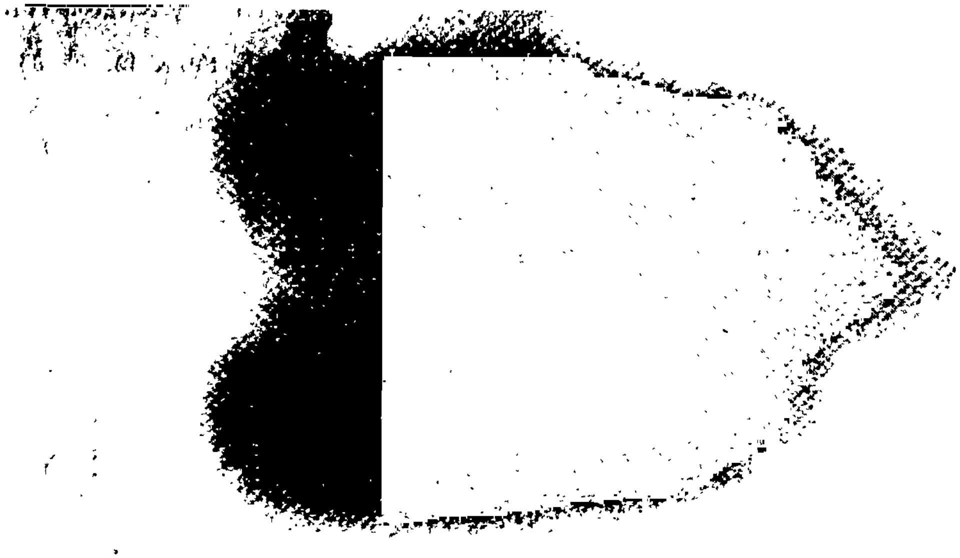

Fig. 1.—Roentgen film upon which 3 ampules of Thorotrast were placed on Feb. 11, 1943. The film was developed thirty-five days later. Deep traces of radioactivity were observable (see text).

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Read at a meeting of the European Sections of the International College of Surgeons, Turin, Italy, June 1-7, 1954.

Submitted for publication Aug. 30, 1954.

same image of residual Thorotrast as was observed on the earlier film.

Since medical treatment resulted in no improvement, the patient requested surgical relief. A left nephrectomy was performed. No radioactive substance was discovered in the kidney at the Radium Institute. Half of the extirpated kidney was then placed on a roentgenographic film for six weeks, after which it showed deep radioactive traces (Fig. 3). It is thus evident that autoradiography is more sensitive than the Geiger counter.

The second half of the kidney was examined at the Pathological Institute (Prof. Rutishauser). No pathologic condition was observed.

The patient left the hospital on November 26, free from pain. She is still well at the time of writing.

CASE 2 (Dr. R. Hoffmann).—An intravenous pyelographic study with Thorotrast was done on May 9, 1945. Roentgenographic examination of the spine revealed spots at the level of both renal pelves, considered to be residuals of Thorotrast. There were no clinical renal symptoms.

CASE 3.—Dr. Hans Zollinger, Director of the Pathological Institute of St. Gall, has reported a case of spindle cell carcinoma of the kidney (Rev. suisse de méd. 52:1266, 1949) in which the carcinoma appeared sixteen years after a pyelographic procedure. In 1933, an injection of 30 cc. of Thorotrast was made into each kidney. The study revealed left hydronephrosis. Prof. Brunner of Zürich advised nephrectomy, which the patient refused, although, like my own patient in the case first described, he persisted in complaining of pain in the left kidney.

In 1949 the patient's suffering caused him to enter the University Clinic of Zürich. A new roentgenographic study showed that the hydronephrosis had increased since 1953. A black spot was observed on the superior part of the renal pelvis, which was considered to be a residual of Thorotrast. Nephrectomy was performed. On microscopic section, it was seen that a tumor, apparently a spindle cell sarcoma, had developed from the upper part of the renal pelvis, where the Thorotrast residuals were localized.

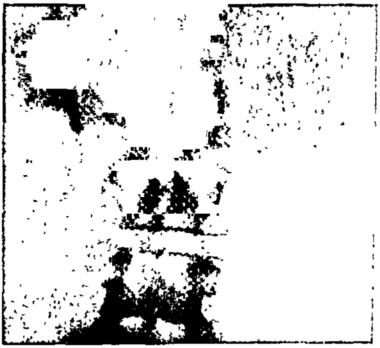

Fig. 2.—Roentgenogram taken of patient who had undergone pyelographic study with Thorotrast three years earlier. Note that traces of radioactivity are still observable.

SUMMARY AND CONCLUSIONS

It has been shown by experiments that Thorotrast has undeniable radioactivity, which lasts for years and is not eliminated or resorbed. Such permanent radioactivity

Fig. 3.—Roentgen film on which half of extirpated kidney (see text) was placed and left for six weeks, after which traces of radioactivity [illegible]senting residuals of Thorotrast were present.

must be considered a primary cause of cancer. From the experiments of Cherling and Guérin, who produced experimental sarcomas in mice by the use of Thorotrast, and from the cases here reported, one must conclude that the use of this substance is to be avoided, except, perhaps, in a few exceptional cases.

There are many other well known substances that serve the same purpose. One is the Hepatoselectan of Degwitz, produced before the war by Schering. I have demonstrated the fact that Hepatoselectan has the great advantage of being immediately resorbed and eliminated. It is also free from toxic effects.

RÉSUMÉ

1. Le thorotrast, d'après mes expériences, a un pouvoir radioactif indéniable, qui persiste des années durant; il ne s'élimine pas, il ne se résorbe pas.
2. Cette radioactivité chronique est certes un facteur de la genèse cancéreuse.
3. Si l'on tient compte des expériences d'Oberling et Guérin, qui ont provoqué des sarcomes expérimentaux par thorotrast sur des souris, et d'autre part des observations précitées, il faut renoncer dorénavant à l'utilisation du thorotrast, à moins de cas exceptionnels.

RIASSUNTO

E' stato dimostrato sperimentalmente che il, Thorotrast ha un'attività che si protrae per anni, senza eliminarsi nè riassorbirsi. Tale radioattività deve essere considerata come una causa importante di cancro.

In base alle esperienze di Oberling e Guerin, che produssero sperimentalmente sarcomi nei ratti con l'uso del Thorotrast, e all'esperienza personale, l'Autore conclude che lo impiego di questo prodotto deve essere proscritto in ogni caso salvo rare eccezioni.

Vi sono molte altre sostanze ben note che possono benissimo sostituire il Thorotrast e fra esse l'Epatoselector (Degniz) che è un prodotto a rapido riassorbimento e rapida eliminazione, oltre ad essere non tossico.

RESUMEN

Por diversos experimentos se ha demostrado que la radioactividad del "Torotrast" permanece durante various años, no siendo eliminado ni absorvido por lo que debe considerarse como una causa primaria de cáncer.

De los experimentos de Oberling y Guérin, quienes produjeron experimentalmente sarcomas en el ratón por el uso del "Torotrast," y de los casos que aquí se comunican, se concluye que, debe condenarse el uso del "Torotrast" salvo raras excepciones.

Existen otras substancias bien conocidas como ei "Hepatoselector" (Degnitz), que sirven para el mismo propósito, teniendo la ventaja de ser reabsorvidas y eliminadas inmediatamente y carecer de efectos tóxicos.

ZUSAMMENFASSUNG

Es ist experimentell nachgewiesen worden, dass das Thorotrast eine jahrelang anhaltende Radioaktivität besitzt und vom Körper weder ausgeschieden noch absorbiert wird. Die anhaltende Radioaktivität muss als eine mögliche Ursache des Krebses in Betracht gezogen werden.

Auf Grund der Tierversuche von Oberling und Guérin, die durch die Anwendung von Thorotrast Sarkome bei Mäusen hervorrufen konnten, sowie der hier berichteten Fälle muss man-mit vielleicht einigen wenigen Ausnahmen—zur Ablehnung der Anwendung des Thorotrasts kommen.

Es gibt viele andere wohlbekannte Mittel, die das Thorotrast ersetzen können. Eines von diesen, das Hepatoselectan

(Degnitz), bietet den Vorteil sofortiger Resorption und Ausscheidung und führt zu keinerlei toxischen Nebenerscheinungen.

SUMARIO

Já foi experimentalmente demonstrado que o Thorotrast tem radio-atividade que perdura durante anos, não se dando sua eliminação ou reabosorção. Esta radioatividade permanente deve considerada como causa primária de câncer.

De acôrdo com as experiências de Oberling e Guérin, que produziram sarcomas experimentais em camondongos, empregando Thorotrast, bem como com os casos aqui apresentados, devemos concluir dever ser condenado o uso de Thorotrast, salvo, talvez, em poucos casos excepcionais.

Há muitas outras substâncias bem conhecidas e que se prestam ao mesmo fim, uma das quais, o Hepatoselector (Degnitz), apresenta a grando vantagem de ser imediatamente reabsorvida e liminada, não tendo ainda qualquer efeito tóxico.

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Thought, social relations, biological activities, cosmic backgrounds—all call for a system of manifold cooperations, and the finer life becomes, the more complicated is this network, and the more highly conscious must one become of one's relations within it. Goethe once put the case admirably in a conversation with Eckermann: "People are always talking about originality; but what do they mean? As soon as we are born, the world begins to work upon us, and keeps on to the end. What can we call ours, except energy, strength, will? If I could give an account of what I owe to great predecessors and contemporaries, there would be but a small remainder." The person who fancies he has made his own career, or the inventor who believes he has the sole right to his invention, or the philosopher who announces a completely new system of thought, is merely ignorant of his sources. Darwin formulated his Origin of Species with the sense of having made a unique personal discovery; before he was finished the similar hypothesis of another young naturalist, Wallace, was brought to his attention; by the time he published his second edition, he had at last become aware that a whole literature on evolution had preceded his announcement. The individual contribution, the work of any single generation, is infinitesimal: the power and glory belong to human society at large, and are the long result of time.

—*Mumford*

A New Operation for Diversion of the Urine, with Voluntary Control of Feces and Urine: Further Report[*]

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ALMOST a year ago we presented a preliminary report of a new operation for diversion of the urinary stream.[*] This procedure attempts to fulfill the two essential requirements for ideal diversion: (1) maintenance of normal renal function, without progressive renal damage or reabsorption of urinary constituents, and (2) continence and voluntary control of both the fecal and the urinary stream. A review of the methods of diversion now in use shows that there is no procedure in current use that satisfies both requirements.

As experience with the operation has increased, a number of minor but important changes have been made in the technic. It has, therefore, seemed advisable to present a report of the most recent case in which the operation was performed.

Present-day Methods of Diverting the Urine. — Ureterosigmoidostomy provides for diversion with voluntary control of feces and urine. Recent studies by numerous workers have shown that after this procedure the prognosis for longevity is poor, regardless of the incidental pathologic picture. Creevy's studies indicated that the hazards of ureterosigmoidostomy stem from direct ascent of bacteria from fecal contamination, increased intracolic pressure, stenosis of the anastomosis and hyperchloremia with secondary acidosis. Much work on the mechanism of hyperchloremic acidosis has produced evidence that chronic pyelonephritis—in itself serious—merely compounds this complication. Boyce showed that reabsorption of the components of urine is greater the more proximal the bowel. Thus, simple ureterosigmoidostomy creates a situation that involves mixing of the fecal and urinary streams, regurgitation of contaminated urine to the kidneys, and regurgitation of urinary components to higher segments of the bowel where reabsorption is more active. There is also the question of the effect of chronic infection and fecal contamination on the anastomosis itself and on subsequent stricture formation. Despite these drawbacks, simple ureterosigmoidostomy, in our opinion, has a definite place in the urologist's armamentarium for diversion of the urine—namely, in cases of disease (such as inoperable carcinoma) that rules out long life, or when the patient's general condition precludes a more lengthy procedure.

As an alternative to simple ureterosigmoidostomy, the urologist may divert the urine and separate the fecal and urinary streams, in an effort to prevent the serious sequelae aforementioned. Although this offers a far more favorable prognosis, it

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[*] Lowsley, O. S., Johnson, T. H. and Rueda, A. E.: A New Operation for Diversion of the Urine, with Voluntary Control of Feces and Urine: Preliminary Report. J. Internat. Coll. Surg. 20:457, 1953.

Submitted for publication Sept. 24, 1954.

invariably produces fecal or urinary incontinence. The easiest recourse is diversion to the skin, which has obvious disadvantages. Isolating a segment of intestine and suturing it to the bladder necessitates leaving a good portion of the affected bladder intact, and, in addition, demands that it function. It is conceivable, however, that some highly selective situations in the bladder might allow for this. The use of an isolated segment of intestine (usually cecum), with a stoma to the skin made from the appendix or ileum, represents an attempt to obviate the continuous leakage of urine. If the ileocecal valve is competent, catheterization is still necessary to empty the new bladder; voluntary control of urine is not exercised, and the patient has an unnatural orifice in the abdomen.

Recognizing the fact that lack of control of micturition is a far greater problem to the patient than lack of fecal control, Boyce and Vest devised a procedure for diversion of the urine in cases of exstrophy of the bladder. This method consisted of suturing a portion of the bladder containing the ureteral orifices to the rectum, repairing the defect in the abdominal wall, closing the rectum above the point of anastomosis and creating a permanent sigmoid colostomy. A similar plan for diversion (use of the rectum as a new bladder, with a permanent sigmoid colostomy) was utilized in 8 cases by Kinman, Sauer, Houston and Melick. These well-conceived operations substitute urinary continence of urine for the more easily controlled fecal incontinence by colostomy. They do more: They provide a sterile bladder, under voluntary control, in the lowermost segment of the intestine, where reabsorption is minimal. Since the principle of these two procedures was incorporated into the operation described here, we have been delighted to note the absence of electrolyte imbalance and pyelonephritis in the follow-up on the cases.

Essential Features of the Authors' Operation.—Essentially, the authors' operation consists of two major steps: (1) the creation of a new bladder, with use of the isolated rectum; (2) the creation of a new rectum, with use of the proximal sigmoid. The sigmoid is mobilized and drawn through the rectovesical pouch and out through the perineum, immediately anterior to the anus and *under the intact external sphincter ani muscle.*

The end result is a patient able to void urine through the anus under voluntary control. Fecal material is passed through the colostomy immediately anterior to the anus. The outlets for the fecal and urinary streams are both encircled by the intact external sphincter ani muscle.

As was pointed out in our preliminary report, this operation provides a number of vital advantages, one or more of which are lacking in any present-day method: (1) continence of feces with voluntary control; (2) continence of urine with voluntary control; (3) separation of the fecal and urinary streams, with the provision of a sterile reservoir for urine; (4) no regurgitation of urine to higher, more absorptive segments of the colon; (5) no artificial orifice in an unnatural site; (6) conditions that permit cystectomy, if indicated and (7) a distensible artificial bladder amenable to cystoscopic examination.

REPORT OF CASE WITH DESCRIPTION OF OPERATION

E. P., a 51-year-old white man, was admitted to St. Clare's Hospital on June 18, 1954, with marked gross hematuria of three months' duration. For over three years he had been under treatment for proved transitional cell carcinoma of the bladder, first by repeated fulguration and, when this failed, by segmental resection performed three years prior to admission. The tumor recurred and, despite further fulguration, covered almost the entire vesical mucosa. Hematuria became uncontrollable, and the patient was referred to us for diversion of the urine.

On admission, secondary anemia was evident (erythrocyte count 2,700,000 per cubic millimeter, with Hgb. 8 Gm. of hemoglobin). Transfusions of whole blood were given until the blood count reached normal levels.

Cystoscopic examination showed an extensive papillary growth covering the entire surface of the bladder. An excretory urogram showed the upper parts of the urinary tract to be normal in spite of the extensive tumor. Chemical tests of the blood disclosed no azotemia or ion imbalance.

In our opinion, the patient urgently required diversion of the urine to prevent certain exsanguination. Moreover, in spite of the probable inoperability of the primary lesion, considerable comfort could be afforded him by the new operation.

Intestinal antisepsis was obtained by the method suggested by Poth, as follows: Castor oil, 2 ounces, Neomycin, 1 Gm., and Phthalylsulfathiazole, 1.5 Gm., were given twenty-four hours before operation. The same dose of Neomycin and Phthalylsulfathiazole was repeated every hour for 3 more doses, then every four hours until operation. In addition, a 1 per cent solution of Neomycin was instilled into the rectum and sigmoid two hours before the operation.

With the patient on the operating table, a No. 30 F catheter was inserted into the rectum and sutured *in situ* to the skin.

Operation.—A transverse incision was made in the lower part of the abdomen. A considerable number of peritoneal adhesions from previous operations were encountered, and it was necessary to dissect these free to obtain access to the left parietal peritoneum and the left ureter. Both ureters were located, transected close to the bladder and intubated with No. 7 F polyethylene catheters. Care was taken not to crush or otherwise injure the proximal ends of the ureters.

The site of transection of the rectosigmoid was determined by ascertaining the level at which an easy ureteroenterostomy could be effected. A Von Petz clamp was applied, and the rectosigmoid was transected distal to the double layer of clips. Lateral traction sutures held the rectum in position as all remaining Neomycin solution was suctioned from the rectal ampulla.

A sharp-nosed clamp was plunged through the rectal wall posteriorly on each side, and the ureters were drawn by a single traction suture into the rectal lumen. We then performed direct mucosa-to-mucosa anastomosis, using interrupted No. 00 atraumatic chromic catgut sutures and working from inside the rectal lumen. Serosal fixation sutures were applied. The anastomoses were then intubated with polyethylene catheters and the catheters passed into, and fixed to, the No. 30 F rectal catheter. The open rectum was closed with a double layer (continuous mucosal and interrupted mucosal) of No. 00 atraumatic chromic catgut sutures, thus completing the new bladder.

The sigmoidal mesentery was next dissected from the proximal sigmoid until sufficient mobility had been obtained to allow the latter to pass through the rectovesical space and out through the perineal incision. Preservation of the secondary vascular arcades preserved the viability of the end of the sigmoid.

The patient was then placed in the perineal position, and an incision was made 1 cm. anterior to the anus. The plane of dissection was carried under the intact external sphincter ani muscle and anterior to the rectal wall until the rectovesical space was encountered. The assistant above the field placed the traction sutures holding the sigmoid and a Penrose drain in the jaws of a uterine packing forceps passed from below, and the sigmoid and drain were drawn into the perineum. As the Von Petz clips were dissected free, the blood supply was noted to be excellent. The sigmoidal mucosa was sutured to the edge of the skin with interrupted sutures of No. 0 chromic catgut. The perineal wound was closed, the patient returned to the supine position and the abdominal wound closed in layers, with peritoneal drainage.

The postoperative course was uneventful. All splinting catheters and drains were removed within one week. Complete voluntary control of both feces and urine could be exercised on the tenth postoperative day.

After a course of radium and roentgen therapy, the patient was discharged on the twenty-second postoperative day.

Postoperative Follow-up.—At the time of writing, two months after the operation, the patient has excellent voluntary control over feces and urine. He wears no appliances or special perineal padding, and is able to carry on his daily routine in comfort. The blood count and blood chemical values have remained normal.

SUMMARY

The two requirements essential for ideal diversion of the urine are (1) the main-

tenance of normal renal function, without progressive renal damage or reabsorption of urinary constituents, and (2) continence and voluntary control of both the fecal and the urinary stream. Current methods of diversion are reviewed briefly, showing that no procedure now in use fulfills both of these requirements.

The authors' operation, a preliminary report of which was presented in October 1953, attempts to satisfy these criteria. A new bladder is created from the isolated rectum and a new rectum from the proximal sigmoid, the latter being mobilized and drawn through the rectovesical pouch and out through the perineum, immediately anterior to the anus and under the intact external sphincter ani muscle. The outlets for the fecal and urinary streams are, therefore, both encircled by the intact external sphincter ani muscle, providing fecal and urinary control with voluntary elimination.

The advantages of the method are set forth.

An illustrative case, with a description of the operation as at present performed, is presented. The results in this case two months after operation were excellent.

Parenthetically, it might be added that the first patient operated upon by this procedure (July 3, 1953) continues to show a good result, and has been following his normal routine in comfort. There is no evidence of recurrent malignant disease. Fecal and urinary control are excellent. Excretory urograms show good function and no sign of hydronephrosis. The blood chemical levels remain unchanged. Cystoscopic examination of the new bladder shows indigo carmine appearing within five minutes.

RESUMEN

Los dos requerimientos esenciales para la desviación ideal de orina son: (1) el mantenimiento de un función renal normal, sin lesión renal progresiva o reabsorción de los constituyentes urinarios, y (2) la continencia y control, voluntario de heces y orina. Se revisan brevemente los métodos comunes, mostrandose que actualmente, ningun procedimiento llena los requerimientos.

La operación de los autores, de la cual se presentó una comunicación preliminar en 1953, es un intento para satisfacer estos criterios. Se crea una nueva vejiga a partir del recto aislado y se forma un nuevo recto a partir de la porción proximal del sigmoide, siendo mobilizado este último y llevado a través del fondo de saco rectovesical y el periné, inmediatamente anterior al ano y bajo el músculo del esfínter anal externo. or consiguiente ambas salidas la fecal y la urinaria estan rodeadas por el esfínter anal externo, proporcionando control con eliminación voluntaria.

Se establecen las ventajas del método.

Se presenta un caso ilustrativo, con descripción de la operación. Los resultados de este caso fueron excelentes hasta el momento de escribirse este artículo (dos meses después de la operación).

Igualmente, puede decirse que el primer paciente operado por este procedimiento (Julio 3, 1953) continúa mostrando un buen resultado y ha seguido su rutina habitual. No ha habido evidencia de recurrencia maligna. El control fecal, así como el urinario son excelentes. Los urogramas excretores muestran buen funcionamiento sin signos de hidronefrosis. Los valores de química sanguínea permanecen sin modificación. El examen cistoscópico de la nueva vejiga muestra la aparición de indigo carmín a los cinco minutos.

RIASSUNTO

I due requisiti essenziali per un'ideale diversione dell'urina sono: 1) mantenimento di una funzione renale normale, senza danno renale pro essivo e riassorbimento dei c i

2) continenza e controllo volontario delle feci e delle urine. Vengono brevemente considerati i metodi di diversione dell'urina attualmente in uso, allo scopo di dimostrare che nessuno di essi possiede ambedue i requisiti suddetti. L'intervento ideato dagli autori, già presesntato una prima volta nell'ottobre 1953, rappresenta un tentativo di raggiungere le mete suesposte. Tale intervento crea una nuova vescica utilizzando il retto isolato, ed un nuovo retto utilizzando il tratto prossimale del sigma mobilizzato, abbassato ed abboccato all'estremo facendolo passare attraverso lo sfondato retto-vescicale ed il perineo, subito al davanti dell'ano ed entro lo sfintere esterno di tale orifizio. In tal modo, essendo i due tratti terminali escretori circondati dallo sfintere esterno dell'ano, la continenza e l'emissione delle feci e delle urine risultato sotto il controllo della volontà. Viene presentato un caso dimostrativo, assieme alla descrizione della tecnica presentemente usata. I risultati di questo caso all'epoca dello scritto (e cioè 2 mesi dopo l'intervento) sono eccellenti. Gli autori, infine, aggiungono che il primo paziente operato in tal modo nel luglio nel 1953 continua a star bene e a seguire una vita normale, senza segni di recidive e con perfetto controllo delle feci e delle urine. Esami urografici hanno dimostrato una buona funzione renale e l'assenza di idronefrosi. L'azotemia è immutata. Esami cistoscopici della nuova vescica hanno permesso di apprezzare l'eliminazione del colore dopo cinque minuti.

SUMARIO

Os dois requisitos essenciais para a derivação ideal da urina são: (1) a manutenção da função renal normal, sem lesão renal progressiva ou reabsorção dos constituintes da urina e (2) a continencia e contrôle voluntárie tanto da corrente urinária como fecal. Os métodos correntes de derivação da urina são revistos sumàriamente, demonstrando-se que atualmente nenhum método preenche ambos os requisitos.

A operação do A., cuja nota prévia foi apresentada em Outubro de 1953, tenta satisfazer este critério. Uma nova bexiga é criada, a partir do reto isolado e um novo reto é formado, a partir da porção proximal do sigmoide, o qual é mobilizado e tracionado através do fundo de saco reto-vesical e através do perineo, imediatamente anterior ao anus e sob o esfincter externo do anus intacto. As saidas para as correntes urinárias e fecal são pois ambas circundadas pelo esfincter externo do anus intacto, obtendo-se assim controle fecal e urinário, com eliminação voluntária.

As vantagens do método são apresentados.

É apresentado um caso, com a descrição da operação como é feita atualmente. Os resultados deste caso, no ocasião em que este artigo foi escrito (dois meses após a operação) são excelentes.

Pode ser ainda acrescentado que o primeiro paciente operado por este método (3 de Julho de 1953), continua a apresentar bom resultado, vivendo normalmente. Não há sinal de recidiva do processo maligno, havendo excelente contrôle fecal e urinário. A urografia excretora demonstra bôa função, sem sinal de hidronefrose. Os valores químicos so sangue permanecem inalterados. O exame cistoscópico da nova bexiga demonstra o aparecimento do indigo carmin dentro de 5 minutos.

ZUSAMMENFASSUNG

Die beiden wesentlichen Forderungen, die eine ideale Umleitung des Harnabflusses erfüllen muss, sind (1) die Erhaltung der normalen Nierenfunktion ohne fortschreitende Nierenschädigung oder Rückresorption von Harnbestandteilen und (2) die Herstellung der Fähigkeit, sowohl Stuhl als auch Harn willkürlich zu verhalten und zu entleeren. Ein kurzer Über-

blick über die zur Zeit üblichen Verfahren der Umleitung des Harnstroms ergibt, dass keine der gegenwärtigen Methoden *beide Forderungen erfüllt.*

Die von den Verfassern angegebene Operation, über die ein vorläufiger Bericht im Oktober 1953 veröffentlicht wurde, stellt einen Versuch dar, diesesn Kriterien gerecht zu werden. Es wird eine neue Blase vom isolierten Rektum und ein neues Rektum vom proximalen Abschnitt des Sigmoids geschaffen; dabei wird das Sigmoid mobilisiert und durch den rektovesikalen Raum und durch den Damm dicht vor dem After und unterhalb des intakten äusseren Schliessmuskels nach aussen gezogen. Auf diese Weise sind die Öffnungen für die Kotsäule sowohl als auch für den Harnstrom von dem intakten äusseren Schliessmuskel des Afters umfasst, wodurch die Möglichkeit zu willkürlich kontrollierter Kot—und Harnausscheidung gegeben wird.

Die Vorzüge des Verfahrens werden erklärt.

Ein erläuternder Fall wird unter Darstellung der Operation, wie sie heute ausgeführt wird, beschrieben. Die Ergebnisse in diesem Fall sind zur Zeit der Niederschrift dieser Arbeit (zwei Monate nach der Operation) ausgezeichnet.

Es wird erwähnt, dass der erste mit *disser Methode operierte Patient* (3. Juli 1953) fortgesetzt gute Resultate zeigt und seiner normalen Lebensweise störungslos nachgeht. Er zeigt keine Anzeichen eines Wiederauftretens des Krebses. Die willkürliche Kontrolle über Kot—und Harnausscheidung ist ausgezeichnet. Das Ausscheidungspyelogramm zeigt eine gute Nierenfungtion ohne Anzeichen von Hydronephrose. Die chemischen Blutuntersuchungen zeigen keine Veränderung der Werte. Bei zystoskopischer Untersuchung der neuen Blase zeigt sich die Ausscheidung des Indigorots innerhalb von 5 Minuten.

RÉSUMÉ

Exigences essentielles en vue d'une bonne néo-vessie: 1. maintien d'une fonction rénale normale (absence de lésion rénale progressive). 2. Continence et contrôle *volontaire aussi bien anal qu'urinaire.* Les méthodes courantes sont brièvement passées en revue. Aucune technique actuelle ne remplit ces deux conditions.

L'opération proposée par les auteurs (un rapport préliminaire en a été présenté en octobre 1953) tente de satisfaire à ces deux critères. La nèo-vessie estt créce à patrir du rectum que l'on isole, ainsi qu'un nouveau rectum, à partir de la portion proximale du sigmoide, ce dernier étant mobilisé et tiré à travers la poche recto-vésicale et hors du périnée, immédiatement en avant de l'anus et sous le sphincter et le muscle externes. La continence urinaire et anale et aisni assurée.

Les auteurs exposent les avantages de cette méthode et présentent un cas type avec description de la technique opératoire. Les résultats sont excellents dans ce cas jusqu'à ce jour (deux mois après l'opération.

Le premier malade opéré selon cette méthode (3 juillet 1953) continue à se *bien porter et mène une vie normale.* Il n'y a pas trace de récidive maligne. Excellent contrôle urinaire et anal. Absence d'hydronéphrose. Pas de modification sanguine. L'examen cystoscopique de la néo-vessie indique le passage de l'indigo carmin après cinq minutes.

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Nothing so interesting as a self in action. I have to read many hundred student papers. When a writer says "I" and goes on to tell a bit of his life that meant something to him, tells it as if he were the first man on earth to live it, I find myself taking notice. No matter how trite it is, if it is fresh to him I enjoy it. A spirit of living is the most communicable thing in the world, and the most worth communicating.

Perfect meditation has a character and beauty of its own. It is a mature and spontaneous utterance falling like ripe leaves on a still day in the fall of the year. The reader may watch it if he pleases, it exists for itself, not for him. The thoughts of solitude are heard in solitude, and have an inward chime that public thoughts must lack.

It seems to me that Emerson does not hold the reader by his mere personality and style, as Thoreau does, but that we require him to be saying something profound or uplifting. Their attitudes are very unlike; one is a prophet uttering his inspirations before an audience, the other a meditative thinker hardly conscious of a public.

—*Benson*

Total Resection of the Right Lobe of the Liver

Report of a Successful Case

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KYOTO, JAPAN

JUDGING from the results of experimental major resection of the liver in animals, particularly monkeys, one may expect success with total removal of the right lobe of the liver in man, although this procedure, unlike resection of the left lobe, presents some exceedingly difficult problems.

The chief problem is to devise a technic that will obviate damage to the hepatic vein.

Wendell,[1] in 1911, first reported a case in which total resection of the liver was successfully performed. Recently, Lortat-Jacob and Robert[2] succeeded in this operation by the thoraco-abdominal approach. Except for these 2 cases we have found no mention of similar successes in the literature. Even at present, therefore, it may be said that the right lobe of the liver does not lie within the surgically manageable domain.

This article describes a case of total resection of the right hepatic lobe, performed recently in our clinic. Fortunately the operation was successful, and the patient enjoyed a useful life for more than a year before he died of recurrent carcinoma. This patient, a 22-year-old man, had undergone radical operation elsewhere (for cancer of the rectum) approximately two years earlier. About three months before his admission to our hospital he felt weak and noticed a tumorous growth below the right costal margin. On admission he was observed to be well developed, though somewhat poorly nourished. The temperature, pulse rate and respiratory rate were normal. The liver was palpable about 4 cm. below the costal margin. Its surface was nodular and rather hard, but it was not tender to pressure. Except for enlargement of the right lobe, no positive physical abnormalities were observed.

Operative Technic.—An upper abdominal incision is first made, after which a long right subcostal and a short left transrenal incision are added (Fig. 1). By combining these incisions we are able to obtain a good and adequate view of the operative field. In the present case there

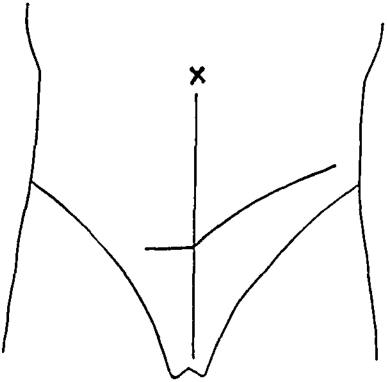

Fig. 1.—Incision (see [illegible]).

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Submitted for publication Nov. 7, 1953.

were extensive adhesions between the inferior surface of the liver and the transverse portion of the colon. Having dissected these adhesions, we carried out resection of the right lobe as follows:

1. Using Marwedell's technic for reflection of the right costal margin, we obtained additional operating space.

2. We next proceeded to mobilize the right lobe. After dividing successively the

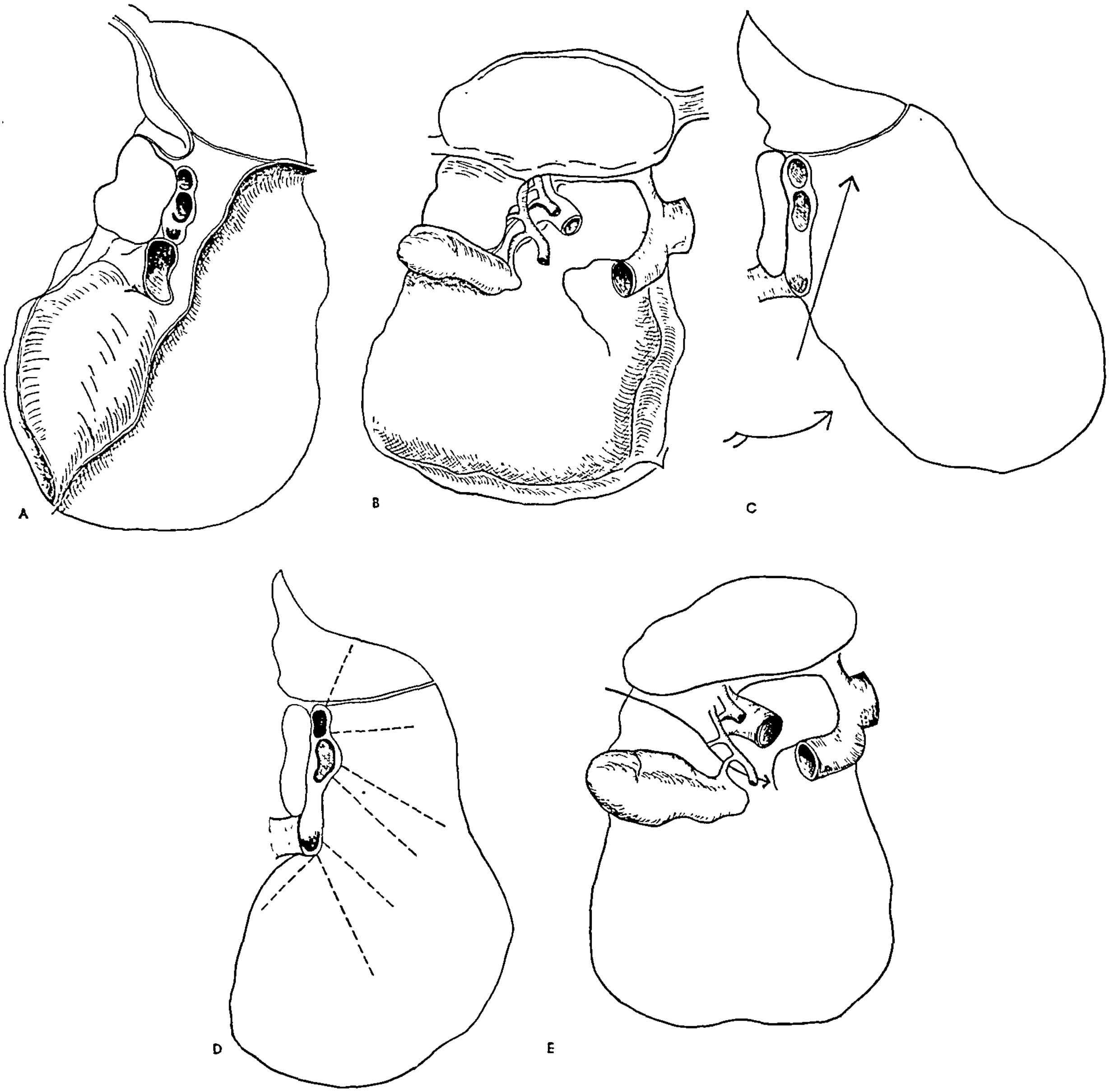

Fig. 2.—*A*, anterior and posterior coronary ligaments and the posterior surface of the liver, which is attached to the diaphragm. *B*, hepatic vessels in the hilar region of the liver. *C*, right lobe pushed forward and to the left. Arrow indicates the direction of the cutting line through the posterior border of the right lobe. *D*, small portion of liver tissue left in place (see text). *E*, arrow indicating the direction of the cutting line through the lobus quadratus.

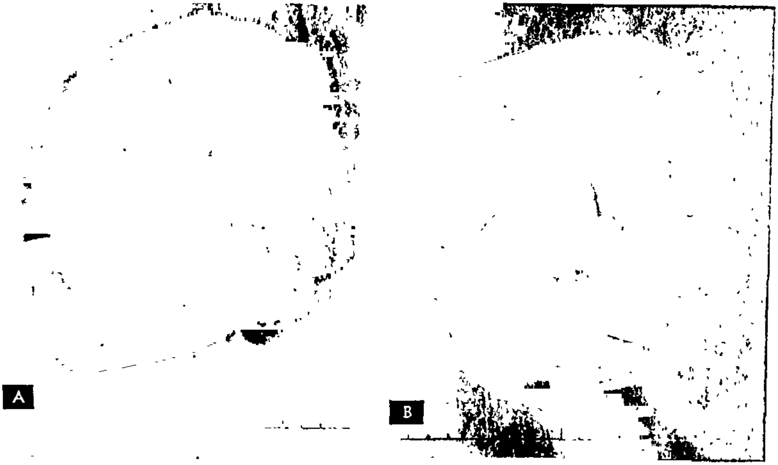

Fig. 3.—*A*, superior aspect of resected lobe. *B*, inferior aspect. The gallbladder is situated at the lower left corner.

round, falciform, triangular and anterior coronary ligaments, we freed the diaphragmatic surface of the liver by blunt dissection, finally dividing the posterior coronary ligament. During these procedures especial care was taken not to injure the inferior vena cava as the manipulation proceeded toward the median line (Fig. 2*A*). The right lobe was then brought forward out of the operative wound, and the hilar region of the liver came into view.

3. The mobilized lobe was held fixedly by an assistant. Management of the hepatic vessels of the right lobe at the hilum was the next problem. First we ligated and divided the right branch of the hepatic artery and then the right branch of the portal vein, the former being more accessible than the latter. As the bifurcation of the portal vein is situated so close to the surface of the liver, every precaution was taken against injury of this vein by mistake. At this point the technic calls for ligation and division of the right branch of the hepatic bile duct, if possible. In this case we could not locate the ductal bifurcation with certainty (Fig. 2*B*); therefore separate ligation and division of the duct was impossible.

Since we had planned to remove the gallbladder together with the right hepatic lobe, we ligated and divided the cystic bile duct at a point proximal to its juncture with the common duct.

4. Removal of the right lobe was then carried out, with meticulous care not to damage (a) the left branch of the hepatic artery and that of the portal vein; (b) the inferior vena cava, and (c) the main branch of the left hepatic vein, which receives the venous blood from the left lobe.

The (Fig. 2*C*) posterior border of the mobilized right lobe was cut through under a mass ligation. A small portion of liver tissue adjacent to the inferior vena cava was left in place. *Figure 2D* is a rough sketch illustrating them.

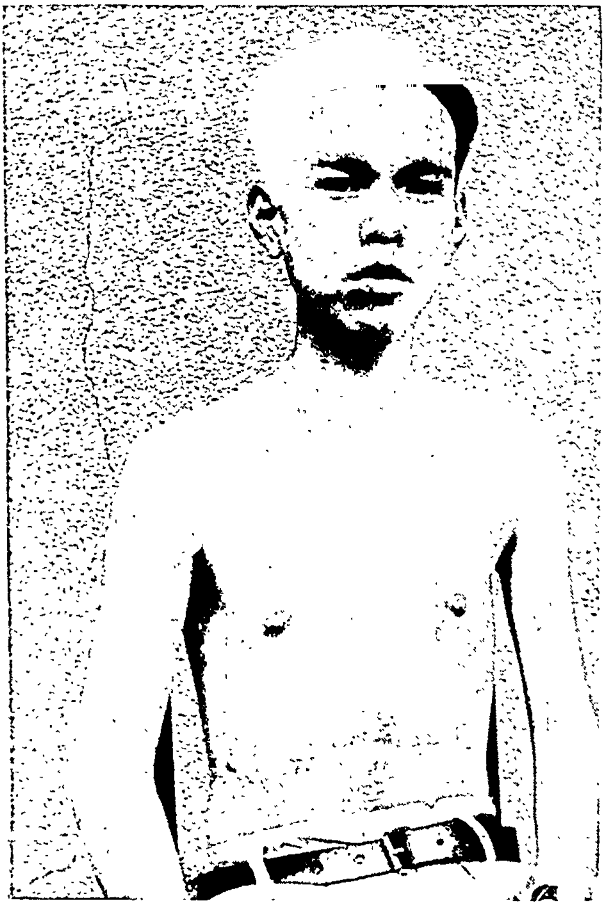

Fig. 4.—The patient photographed four months after the operation.

course of the hepatic veins in a horizontal section of the liver (dotted lines). From this sketch it will be evident that with the aforedescribed technic the main branch of the left hepatic vein is preserved.

Next (Fig. 2*E*) the lobus quadratus was incised along the left side of the gallbladder, from the anterior margin of the right lobe to the level of the hilar region. This incision should cross neither the left branch of the hepatic artery nor that of the portal vein.

After the second section of the liver there remained a relatively small portion of liver substance connecting the right lobe with the left. This portion was next cut through, and thus total resection of the right lobe, together with the gallbladder, was accomplished.

As to hemostasis, it suffices to ligate *en masse*, with a stout silk suture, each of the three parts of the liver to be successively cut through. After the resection the cut surface of the liver is covered loosely with omentum and a rubber drain inserted.

In the case here described the resected right lobe weighed about 1,500 Gm. The microscopic diagnosis was adenocarcinoma (Fig. 3).

Postoperative Course.—After the operation there was considerable ascities, but it disappeared within two weeks, and the output of urine increased.

No clinical signs suggesting acute insufficiency of liver function could be detected.

Laboratory tests of hepatic function disclosed more or less disturbance in the early stages, but all functions returned to the normal range within two months after the operation. The detoxifying capacity appeared to be most disturbed of all.

The general condition of the patient had improved so much four months after the operation that he was able to resume his former work, but the symptoms of recurrent cancer appeared one year later, and he died within a few months thereafter (Fig. 4).

COMMENT

We should like to point out the limits of resection of the right lobe in this case. *A* and *B*, Figure 5, are sketches of the superior and the inferior surfaces, respectively, of the resected right lobe. From these illustrations it will be seen clearly to what extent the liver was resected. Because the borderline between the right and left lobes passes along the falciform ligament, our resection must be called subtotal, not total, in the strictest sense of the term. However, considering the anatomic course of the blood vessels, it is impossible to resect the right lobe totally along the line of this ligament. Our technic, therefore, as presented here, may well be called "Practical total resection of the right lobe of the liver."

SUMMARY

The authors report a case of successful total resection of the right lobe of the liver. The operative technic is described in detail, and illustrations are included for clarification.

RIASSUNTO

Vengono riferiti due casi in cui fu eseguita con successo la resezio ne del lobo destro del fegato; tecnica e documenti esplicativi.

RESUMEN

Los autores comunican un caso de resección total éxito del lóbulo derecho del híga-

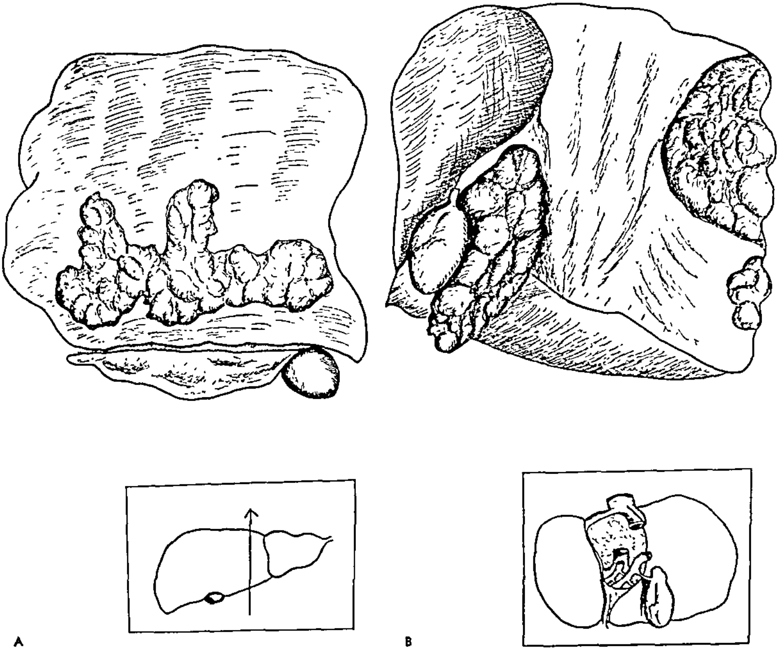

Fig. 5.—See text. Inserts show the limits of the resection.

do. Se describe la técnica operatoria en detalle se incluyen ilustraciones para mayor claridad.

ZUSAMMENFASSUNG

Es wird über eine erfolgreiche Totalresektion des rechten Leberlappens berichtet. Die Operationstechnik wird in ihren Einzelheiten an Hand von erläuternden Illustrationen beschrieben.

RÉSUMÉ

Les auteurs rapportent um cas de guérison par résection totale du lobe hepatique droit. Ils font une description détaillée de la technique opératoire, accompagnée d'illustrations démonstratives.

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. . . It is not enough to recognize that all our knowledge is, in a greater or less degree, uncertain and vague; it is necessary, at the same time, to learn to act upon the best hypothesis without dogmatically believing it . . . One may say broadly: all that passes for knowledge can be arranged in a hierarchy of degrees of certainty, with arithmetic and the facts of perception at the top. That two and two are four, and that I am sitting in my room writing, are statements as to which any serious doubt on my part would be pathological. I am nearly as certain that yesterday was a fine day, but not quite, because memory does sometimes play odd tricks. More distant memories are more doubtful, particularly if there is some strong emotional reason for remembering falsely, such, for instance, as made George IV remember being at the battle of Waterloo. Scientific laws may be very nearly certain, or only slightly probable, according to the state of the evidence.

When you act upon a hypothesis which you know to be uncertain, your action should be such as will not have *very* harmful results if your hypothesis is false.

—*Russell*

Genital Elephantiasis Corrected by a Plastic Procedure

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AND
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As described in the English literature, the treatment of elephantiasis of the genital organs most commonly used has been the excision of elephantiasiac tissue and excess skin. A new scrotum and a covering for the penis are formed from flaps derived from the original scrotal skin by several different technics. This method was reported by Watson,[1] DeSavitsch,[2] Knott and Rice,[3] Kretchman,[4] Connell,[5] Comando and Echikson,[6] Towne,[7] and Pons and Constantine.[8]

Covering the denuded penis with pinch grafts or Thiersch grafts was reported by Watson,[1] Knott and Rice,[3] and Venkateswaren.[9] DeSavitsch allowed the penis to granulate and claimed that in a few weeks it was covered with a proliferation of epithelium from the borders of healthy skin at the base and corona. Young[10] and Connell[5] mentioned the use of the inner lining of the prepuce for coverage of the penis.

Other surgeons have expressed the opinion that to use any of the involved skin is an invitation to recurrence. Some have recognized the desirability of providing new lymphatic channels. Davis[11] advised complete excision of all involved skin and subcutaneous tissue. He covered the penis and formed a new scrotum by skin grafting or by using the apron of normal abdominal skin dragged down over the pubis by the weight of the scrotal mass. Connell[5] was convinced that he established new lymphatic pathways to the lumbar glands by removing the entire fibrous covering of the spermatic cords, and to the internal pudic and prostatic glands by laying bare the perineal muscles and dividing the line of fusion between the two layers of the triangular ligament and Colles' fascia. Lovett-Campbell[12] used the apron of abdominal skin to form the scrotum and made a circular aperture in the base of his flap to provide emergence for the penis. He cautioned against making the aperture too high, as upward traction of the skin flap might cause the penis to "assume a pose of permanent perpendicularity incompatible with mood." Venkateswaren[9] buried the testicles in the groin. Young[10] used skin from the thighs, groin and suprapubic area. Livermore[13] twice used skin from the posterior aspect of the scrotum and flaps from the abdomen or thigh in the hope of connecting with unblocked lymphatics. He had a recurrence at two- and three-year intervals McDonald and Huggins[14] performed an elliptic excision of skin from the thigh and scrotum bilaterally, followed by anastomosis of the thigh to the scrotum.

Pathogenesis.—The causes of genital elephantiasis fall into two categories:

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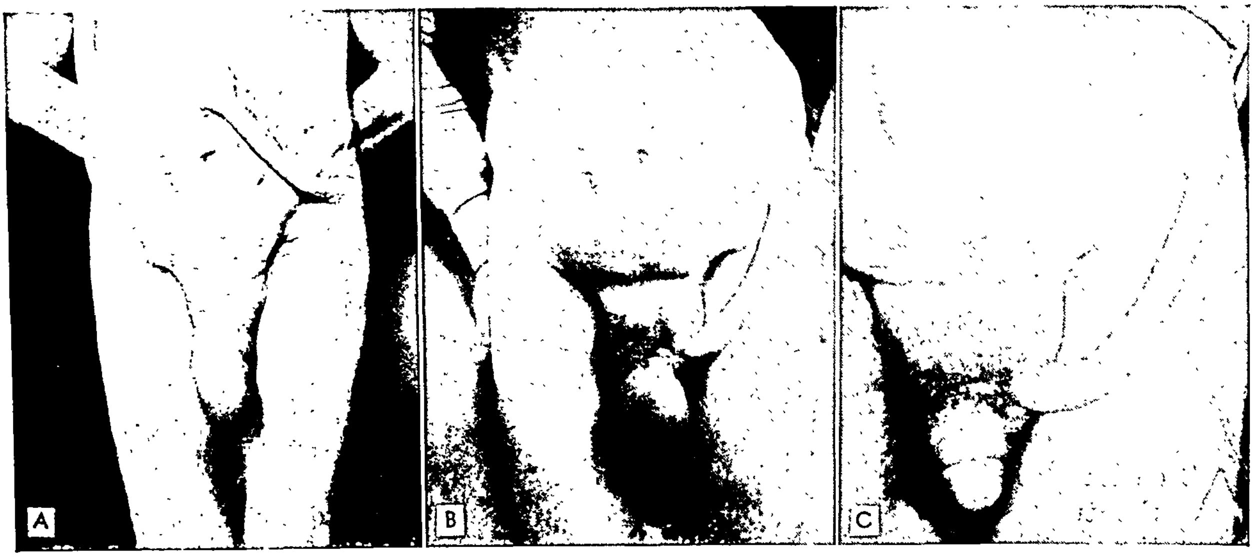

Fig. 1.—*A*, elephantiasis of scrotum and penis following bilateral resection of inguinal glands. Tube pedicle has been prepared on abdomen. *B*, upper end of tube pedicle has been detached and implanted to base of penis and scrotum. Edema gradually subsided and was eliminated after about four months. *C*, patient wearing tube pedicle as he has done for nineteen years. He refuses to have it opened and implanted into the skin of the groin. The edema has never returned.

(1) infection with Wuchereria bancrofti (filariasis) and (2) stasis in the penile and scrotal lymphatics following obstruction resulting from such causes as trauma, surgical interruption of the lymphatic pathways (as in groin dissection), syphilitic hyperplasia, lymphogranuloma venereum, and streptoccic and other infections. Included in the second category would be the case reported by Young[10] in which the lymphatic blockage was caused by paraffin that had been injected into the scrotum to simulate a testicle. In both types the basic pathologic picture of lymphatic stasis leads to imperfect absorption of inflammatory products, which stimulate hypertrophy and induration of the skin and subcutaneous tissues.

REPORT OF A CASE

E. H., a 49-year-old white man, a boat captain, came to the Straith Clinic in September 1934. His chief complaint was of swelling of the penis and scrotum, which made sexual intercourse impossible (Fig. 1).

In 1916 a bilateral inguinal gland dissection had been performed for buboes of 20 days' duration. In August 1929 the patient had gonorrhea, which was treated with a proprietary remedy obtained from a drugstore. The discharge stopped. In December 1929, after inbibing alcohol at a party the night before, he developed a high fever and a feeling of tension in the groin. The penis became red, swollen and painful. These symptoms subsided in two days without medication. He had repeated attacks every three to four weeks, which became progressively more severe. The swelling of the penis and scrotum became chronic, persisting between the acute attacks. He had no pain or burning on urination, but there was some difficulty in starting the stream. Because of the persistent swelling of the penis he was unable to have intercourse from 1933 to 1935.

The patient had had scarlet fever, measles and mumps in childhood, typhoid fever in Brazil in 1910, fracture of the right clavicle in 1916, hemorrhoidectomies in 1911 and 1917, fractured fingers of the left hand in 1927 and an appendectomy in 1928.

The review of systems gave essentially negative results except for the symptoms already described.

Physical examination revealed the patient to be well developed and well nourished. He did not appear acutely ill. The blood pressure in millimeters of mercury was 120 systolic and 70 diastolic. His weight was 145 pounds (20.4 Kg.). There was a sluggish reaction to light by the left pupil, and a small fibroma was observed on the right anterior chest wall. Mild erythema and swelling of the soft tissue were noted over the pubic region. The skin of the shank of the penis was congested, edematous and thickened. The penis was the size of a large cucumber measuring 7⅛ inches (17.9 cm.) in circumference and 6 inches (15.2 cm.) in length; the length of the penis from the upper border of the pubis was 8 inches (20.3 cm.). The skin of the glans appeared normal. The skin of the scrotum was thickened, and its circumference was 10 (25.4 cm.). There was slight scaling of the skin on the groin.

Laboratory reports: Urinalysis: tests revealed the urine to be clear and amber, with a specific gravity of 1.030 and no albumin or sugar. A blood count revealed 4,800,000 red and 6,300 white cells per cubic millimeter, with a differential count of 55 per cent neutrophils, 37 per cent small mononuclear cells, 3 per cent large mononuclear cells, 2 per cent transitional cells, 2 per cent eosinophils and 1 per cent basophils. No fungi were observed in scales from the groin. Serologic tests gave negative results.

The solution of this problem was suggested to the senior author (C. L. S.), by Sir Harold Gillies in a personal communication in November 1934 and was carried out much as he suggested.

On July 10, 1935, a tube pedicle approximately 1 inch (2.5 cm.) in diameter was constructed on the abdomen, extending from the left crest of the ilium to about 3 inches (7.5 cm.) above the umbilicus (Fig. 1). After four weeks the upper end of the pedicle was detached and implanted at the base of the penis and scrotum. There was sloughing of a small portion of the end of the pedicle; nevertheless, a firm union was established (Fig. 2).

After the operation the swelling of the penis and scrotum gradually subsided, and the recurrent febrile attacks ceased completely. For the next ten years the patient wore an athletic supporter. Without this he suffered a mild recurrence of the swelling. Several months after the operation he was able to indulge in sexual intercourse and continued able to do so until his sixty-eighth year when he no longer was able to get an erection. The suggestion was repeatedly made that the tube could be opened into a flap and interpolated into the anterior abdominal wall but the patient was well satisfied with his improvement.

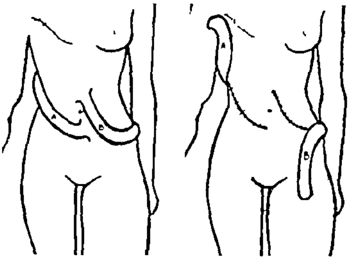

Fig. 2.—*Left*, suggestion of one of us (C. L. S.) for relief of edema of the arm following radical operation on the breast. A thoracoabdominal tube pedicle has been formed on the chest and abdominal wall. *Right*, pedicle formed on abdomen for relief of edema of the leg due to blockage of inguinal glands. *A*, pedicle transferred to arm; *B*, pedicle transferred to leg.

He refused further surgical treatment and for nineteen years has carried the tube pedicle over the groin (Fig. 3).

COMMENT

This case is presented because of the excellent result and the follow-up of nineteen years. The original diagnosis was elephantiasis of the penis and scrotum, which could be accounted for by removal of the glands in the groin or by gradual obliteration of lymph channels owing to recurrent erysipeloid attacks. Patency of some of the lymphatic channels within the penis and scrotum was evinced by the mild diminution of swelling during the quiescent period between the acute exacerbations. It was decided that, if these patent lymphatics could be connected with a new set of central channels, the edema might be relieved. This was achieved by the procedure described. The nineteen-year postoperative history of satisfactory sexual function demonstrates the permanence of the result.

The success obtained here opens to speculation the possibility of using this procedure for the correction of lymphedema elsewhere in the body. In cases of lymphedema of the leg due to obstruction, or to infection other than filarial, a tube similar to the one described in the case report could be attached to the skin of the thigh below the level of the subinguinal nodes. If this were done prior to the onset of fibrosis of the superficial lymphatic channels in the extremity, a new pathway for the escape of lymph might be established (Figs. 4 and 5*B*).

In cases of lymphedema of the arm two methods suggest themselves and might "work" if the procedures were carried out before fibrosis of the superficial lymphatics occurs. 1. A thoracoabdominal tube with its upper attachment posterior to the axilla could be constructed and the lower end interpolated into the skin of the arm below the axillary dissection area as shown in Figs. 4 and 5*A*. This tube could later be opened and incorporated into the anterior chest wall if desired. 2. A tube up the back, following the curve of the scapula, could be attached at its upper end and transplanted into the arm (Figs. 6 and 7). Padgett[15] reported failure in 1 case in which he used a flap. He did not state the duration of the lymphedema, and it is possible that the fibrotic stage had been reached.

SUMMARY

1. Methods described in the surgical literature in English for correction of elephantiasis of the genital organs are reviewed.

2. The pathogenesis of genital elephantiasis is described.

3. A case is presented in which a tube pedicle gave excellent functional results throughout a nineteen-year postoperative period.

4. The use of such a procedure in cases of lymphedema of the extremities is discussed.

ZUSAMMENFASSUNG

1. Es wird ein Überblick über die in englischer Sprache beschriebenen Methoden der Korrektur der Elephantiasis der Geschlechtsorgane gegeben.

2. Die Pathogenese der genitalen Elephantiasis wird beschrieben.

3. Es wird über einen Fall berichtet, in welchem ein Hohlstiel zu ausgezeichneten funktionellen Resultaten während eines Zeitraumes von 19 Jahren nach der Operation führte.

4. Die Brauchbarkeit eines solchen Verfahrens in Fällen von Lymphödem der Gliedmassen wird erörtert.

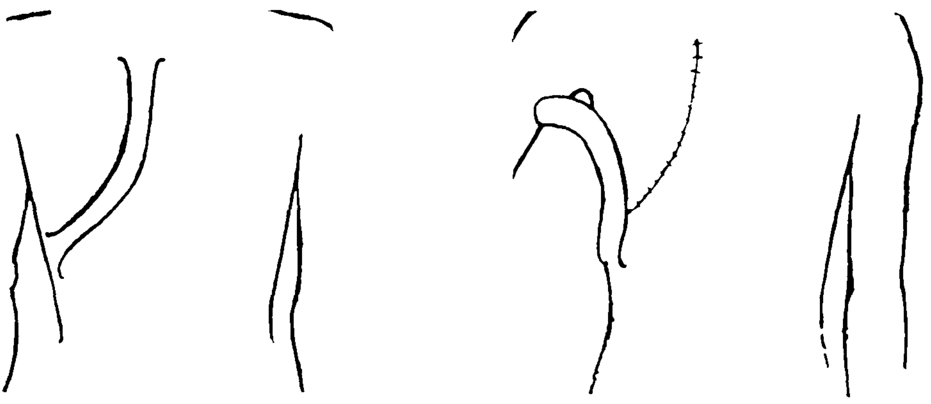

Fig. 3.—Another suggested tube (C. L. S.) for relief of edema of the arm, following the curve of the scapula (sketch at left), with the upper end used to drain the arm (sketch at right).

RESUMEN

1. Se revisan los métodos descritos en la literatura quirúrgica inglesa para la corrección de la elefantiasis de los órganos genitales.

2. Se describe la patogénesis de la elefantiasis genital.

3. Se comunica un caso en el cual un tubo pedicular proporcionó resutados funcionales excelentes a través de un período postoperatorio de diecinueve años.

4. Se discute el uso de dicho procedimiento en el caso del linfedema de las extremidades.

RÉSUMÉ

1. Les méthodes de correction de l'éléphantiasis des organes génitaux décrites dans la littérature chirurgicale en anglais sont analysées.

2. La pathogénèse de l'éléphantiasis génital est décrite.

3. Un cas est présenté, dans lequel un pédicule tubulé a donné d'excellents résultats fonctionnels durant une période post-opératoire de 19 ans.

4. L'utilisation de ce procédé dans les cas de lymphadénomes des extrémités est discutée.

SUMARIO

1. São revistos os métodos descritos na literatura de língua inglêsa para a correção da elefantíase dos órgãos genitais.

2. É descrita a patogênese da elefantíase genital.

3. É apresentado um caso em que obteve-se excelente resultado functional, durante período pós-operatório de dezenove anos.

4. É discutido o uso de tal técnica em casos de linfedema das extremidades.

RIASSUNTO

1. Vengono passati in rassegna i metodi descritti nella letteratura di lingua inglese per la cura chirurgica della elefantiasi dei genitali.

2. Viene descritta anche la patogenesi dell'affezione.

3. Viene presentato un caso in cui si ottenne un eccellente risultato funzionale con un lembo tubulare peduncolato.

4. Questo metodo può essere efficace qualora lo si impieghi nella cura del linfedema degli arti.

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Preparation for Sigmoidoscopy in a Cancer Detection Center

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ROUTINE sigmoidoscopy is an essential technic in the detection of cancer. It has been estimated that approximately 12 per cent of all malignant tumors occurring in the human body originate in the anus, rectum or sigmoid colon.[1] Yeomans[2] observed that 80 per cent of all intestinal cancers were located in the rectum and rectosigmoid—readily accessible via the sigmoidoscope.

For a satisfactory examination, the rectum and sigmoid must be cleansed thoroughly, yet without producing irritation. Not only will violent measures give a false picture of inflammation, edema and even hemorrhage, but also the resultant increased irritability will throw the terminal part of the intestine into a spasm that will resist the passage of the sigmoidoscope and make satisfactory examination impossible.

The routine preparatory administration of repeated enemas, which had been found satisfactory both in private practice and in regular treatment clinics, carried too low a percentage of properly prepared sigmoids for examination in a cancer detection center.

A patient who is concerned about his colon will usually follow instructions meticulously. However, those coming to a detection center as a routine, or because of concern over some organ, pay scant attention to instructions for preparation. Many wish to avoid the proctoscopic examination altogether. Some, having come to the clinic directly from their work, are unable to take the enemas at all. In our clinic, experience has shown that satisfactory sigmoidoscopic examination under these circumstances is possible in only one-third to one-half of the examinees. This conclusion is based on more than 4,000 sigmoidoscopies performed in this clinic by myself. It was necessary, therefore, to look for a more reliable method of preparing the patients for examination.

Marks[3] had demonstrated that segmental catharsis of the lower part of the bowel could be accomplished on the examination table. This, however, required examination and introduction of the proctoscope both before and after the enema, and it tied up the examination table for too long a period to be practicable in a clinic. Marks had poured a mixture of sodium phosphate and biphosphate in through the sigmoidoscope and then had aspirated the bowel content. I had injected the same solution into the rectum by means of a catheter and funnel. This worked satisfactorily but again required a doctor or nurse to administer.

However, when plastic disposable squeeze bottles with foolproof tips became available, it was possible to send the patient to the lavatory with the squeeze bottle, have him administer the enema himself without assistance and have him ready for sigmoidoscopic examination within minutes. In this detection clinic,

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From the Cancer Detection Center of the Brooklyn Cancer Committee at the Beth El Hospital, Brooklyn (Dr. H. I. Teperson, Director).

Fleet Enema Disposable Units were furnished by Dr. H. Haag for the C. B. Fleet Co. of Lynchburg, Va.

Submitted for publication Sept. 13, 1954.

while most of the examinees were instructed, as previously, to take two enemas to cleanse their bowels, four each clinic day were instructed to come in without such preparation. Others instructed could not or would not take the enemas. These, without any prior preparation, were given the plastic bottles to insert. In some instances we did it for them. Either way, the contents of the bottle, consisting of 21.6 Gm. of sodium biphosphate and 8.1 Gm. of sodium phosphate in 4½ ounces (142 Gm.) of water, were squeezed into the rectum. The patient then went to the lavatory.

Of the 66 who were thus treated, 1 evacuated abruptly in the lavatory. The other 65 reported normal satisfying movements without difficulty. Some held back for twenty minutes but said they would have been able to evacuate within five minutes. All were questioned carefully as to burning, cramps or other discomfort with the evacuation. Considering the speed of action of this solution and the tension these examinees were under during a cancer detection examination, it is remarkable that only 2 admitted to cramps and only 3 had a burning sensation for a few seconds.

Sigmoidoscopic examination done thirty minutes or more after the enema revealed considerable clear mucus. If the examination was done sooner, little or no mucus was encountered. The striking feature of a sigmoidoscopic procedure after such preparation is the ease of examination. Relaxation is so marked that in each case one is reminded of megacolon. Marino[4] has long taught that saturated solutions of magnesium sulfate or sodium phosphate will relax spasm in sigmoidoscopic work. The sigmoidoscope seems to fall in without effort and without discomfort to the patient.

As an aid in evaluating the effectiveness of this mode of preparing the bowel, I compared the 66 otherwise unselected patients so prepared with a concurrent group of 175 who were instructed to take an enema the night before and a second one two hours before the examination. Arbitrarily, I decided to group the examinations according to the following criteria: satisfactory sigmoidoscopy, 8 inches or better; fair visualization, 6 to 7 inches (15.2 to 17.7 cm.). Anything short of 6 inches I consider unsatisfactory.

TABLE 1.—*Patients Prepared with Sodium Phosphate and Biphosphate*

Sigmoidoscope passed to	*5 Inches*	*6-7 Inches*	*8 or More Inches*
24 male patients	0	3	21
42 female patients	2	8	32
66	2 (3%)	11 (17%)	53 (80%)

Examination was unsatisfactory in only 3 per cent.

TABLE 2.—*Controls Instructed to Take Regular Enemas at Home*

	5 Inches	*6-7 Inches*	*8 or More Inches*
50 male controls	18	17	15
125 female controls	43	35	47
175	61 (34.8%)	52 (29.7%)	62 (35.4%)

Of those who prepared themselves for sigmoidoscopic examination 34.8 per cent were not properly cleansed.

One might normally expect a 95 per cent incidence of satisfactory sigmoidoscopic procedures. These figures, though low, are significant. All of these examinations were performed by myself, the patients in the study group being interspersed among the controls. Averaging 25 sigmoidoscopic examinations per two-hour clinic session, I had no opportunity to establish rapport with each examinee, nor could I take the time to do any appreciable cleansing through the proctoscope.

In 28 cases of fecal impaction, in some of which it followed recent hemorrhoidectomy, the phosphate mixture produced prompt evacuation within minutes.

The action of sodium phosphate and biphosphate on the rectum was compared with that of magnesium sulfate. The latter, too, was found to be an effective and forceful evacuant when 4½ ounces of saturated solution was used. Some burning, however, was encountered. When the magnesium sulfate was reduced to 75 per cent of saturation, the burning was eliminated but the average evacuation time was increased to twenty minutes.

Using the same solutions in the same amounts for all, I was unable to correlate the time interval between administration and evacuation with the body weight. Patients were able to withhold evacuation for variable lengths of time.

Whereas requests for hospital proctologic consultations had formerly had to wait until the next day to permit the necessary preparatory enemas — and these were frequently inadequate — the use of a disposable squeeze bottle of sodium phosphate and biphosphate has made sigmoidoscopic study of any patient possible within minutes.

In my private work, I have found it advantageous to have a patient come in unprepared. Thus I could see what the rectum looks like before being washed. Particularly in cases of rectal bleeding is it advantageous to examine the patient by proctoscope before the blood has been washed away by enemas. Then, if need be, evacuation can be produced promptly.

SUMMARY

The rectum and sigmoid colon can be rapidly cleansed and relaxed for sigmoidoscopic study in a cancer detection center by rectal instillation of a solution of sodium phosphate and biphosphate. The prompt action of such a solution is a decided advantage when rapid evacuation without spasm is desired, as in cases of fecal impaction or bedside consultation.

SUMARIO

O colon sigmóide pode ser ràpidamente limpo e pôsto em relaxamento, afim de serem feitos estudos sigmoidoscópicos, pela instilação retal de uma solução de fosfato e bifosfato de sódio. A rápida ação de tal solução apresenta vantagem decisiva, quando se deseja evacuação rápida sem espasmo, como acontece em casos de concreções fecais ou consultas em doentes acamados.

RIASSUNTO

In caso di tumore il sigma può essere rapidamente pulito e disteso per l'esame sigmoidoscopico mediante instillazione rettale di una soluzione di fosfato e bifosfato di sodio.

La pronta azione di tale soluzione è un reale vantaggio qualora occorra una rapida evacuazione, senza spasmo secondario, come nei casi di stasi fecale o di esame al letto del malato.

RESUMEN

El colon sigmoide puede ser rápidamente limpiado y puesto en reposo para estudio sigmoidoscópico en un centro para el descubrimiento del cáncer por la instilación rectal de una solución de fosfato y difosfato de sodio. La acción rápida le dicha solución es una ventaja cuando se desea una evacuación rápida sin espasmo, como en los casos de impacto fecal o consulta del enfermo en su cama.

ZUSAMMENFASSUNG

In Institutionen zur Entdeckung von Krebserkrankungen hat sich die rektale Einspritzung einer Lösung von Natrium-

phosphat und Natriumbiphosphat zur raschen Säuberung und Entspannung des Sigmoids zum Zwecke der Sigmoideoskopie als brauchbar erwiesen. Ein entscheidender Vorzug liegt in der schnellen Wirkung einer solchen Lösung, wenn eine unverzügliche Säuberung ohne das Auftreten von Krämpfen erwünscht ist, wie z. B. in Fällen von Kotstauung oder bei Untersuchungen im Krankenbett.

RÉSUMÉ

Le sigmoïde peut être rapidement préparé pour la rectoscopie par un lavement rectal au moyen d'une solution de phosphate et de biphosphate de sodium. Cette solution est des plus utiles lorsqu'on désire une évacuation rapide sans spasme (occlusion intestinale ou consultation au lit du malade).

Author's Note: I am indebted to Miss Lillian Goodman, R.N., Supervisor of the Clinic, for her co-operation.

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Among all the ugly mugs of the world we see now and then a face made after the divine pattern. Then, a wonderful thing happens to us; the Blue Bird sings, the golden Splendor shines, and for a queer moment everything seems meaningless save our impulse to follow those fair forms, to follow them to the clear Paradises they promise.

Plato assures us that these moments are not (as we are apt to think them) mere blurs and delusions of the senses, but divine revelations; that in a lovely face we see imaged, as in a mirror, the Absolute Beauty;—it is Reality, flashing on us in the cave where we dwell amid shadows and darkness. Therefore we should follow these fair forms, and their shining footsteps will lead us upward to the highest heaven of Wisdom. The Poets, too, keep chanting this great doctrine of Beauty in grave notes to their golden strings. Its music floats up through the skies so sweet, so strange, that the very Angels seem to lean from their stars to listen.

But, O Plato, O Shelley, O Angels of Heaven, what scrapes you do get us into!

—*Russell*

Effect of Levallorphan Tartrate on Respiratory Depression During Nitrous Oxide-Oxygen Anesthesia Supplemented by Levo-Dromoran Tartrate

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AN important milestone in the development of anesthesia is the introduction of intravenous agents. One of these, thiopentothal sodium, soon gained the acclaim of surgeons for a variety of operative procedures. The search for better compounds, however, led to the intravenous use of demerol,® morphine, the racemic form of dromoran® hydrobromide, etc., and, more recently, the levorotatory form of dromoran® tartrate (generic name levorphan tartrate).

These agents, if introduced in amounts sufficient to produce adequate supplementation to nitrous oxide-oxygen anesthesia caused marked respiratory depression and not infrequently apnea. Obviously, this is a severe drawback. The adequate and safe administration of any of these supplementary agents, accordingly, depends on an effective method of treatment of the ensuing respiratory depression.

N-allylnormorphine (Nalline®) was introduced some time ago for treatment of respiratory depression in cases of morphine and demerol poisoning. This antagonist was reported to be effective against respiratory depression caused by methadone,® codeine, dilaudid,® pantopon® and dl-dromoran hydrobromide. Nalline, while it corrects the respiratory depression, frequently causes hyperventilation and produces "lightening" of the anesthesia, presumably by lessening the analgesic effect of the aforementioned opiates.[1]

Recently another opiate antagonist became available for experimentation. The chemical name of this drug is levo-3-hydroxy-N-allylmorphinan tartrate. It will be referred to hereafter by its generic designation as levallorphan tartrate. Its base, levallorphan, is related to levorphan (levo-3-hydroxy-N-methylmorphinan), as N-allylnormorphine is related to morphine.

Levallorphan tartrate was investigated in animal experiments as an antagonist to morphine and levorphan tartrate by Fromherz and Pellmont,[2] and to the latter drug and its racemic form by Benson and his associates.[3]

Trials with levallorphan tartrate in man were recently reported by Hamilton and Cullen.[4] These workers observed in the 19 anesthetized patients studied that levallorphan tartrate, administered by intravenous injection, was an effective antagonist to the respiratory depression produced by deliberate overdoses of levorphan tartrate, morphine or meperidine. Six of the 8 sub-

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Levallorphan is the generic name of levo-3-hydroxy-N-allymorphinan. Levallorphan tartrate was formerly known by its experimental number designation, Ro 1-7700.

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Submitted for publication June 15, 1954.

TABLE 1.—*Types of Operation*

Operation	*No. of Patients*
Hip nailing	14
Thompson hip arthroplasty	1
Transurethral resection	2
Bilateral cutaneous ureterotomy	1
Suprapubic cystotomy	1
Excision of neuroma of thigh stump	1
Closed reduction of ankle	1
Cholecystectomy and common duct exploration; removal of ovarian cyst	1
Cholecystojejunostomy and common duct exploration	1
Total	23

TABLE 2.—*Physical Abnormalities Other Than Those Requiring Surgical Intervention*

Physical Abnormality	*No. of Cases*
Arteriosclerotic heart disease	9
Senile emphysema	8
Auricular fibrillation	5
Mental disturbance, confusion or disorientation	5
Alcoholism	3
Nephrosclerosis (moderate)	1
Coronary heart disease	1
Epilepsy	1
Hyperthyroidism	1
Hypertension	2
Neurosyphilis	1
Ventricular extrasystoles	2
Cerebrovascular accident	2

Some of the patients had more than one of the disturbances listed.

jects in whom levorphan tartrate was used as a supplement to nitrous oxide anesthesia were given the opiate first, followed by levallorphan tartrate after respiratory depression had occurred, and in 2 the antagonist preceded the opiate, to prevent respiratory embarrassment.

We decided to extend the trials reported by Hamilton and Cullen and to use levorphan tartrate as a supplement to nitrous oxide-oxygen anesthesia in all cases. Levallorphan tartrate was to be employed to counteract opiate-induced respiratory embarrassment.

Case Material, Procedure and Results.—Twenty-three patients, 8 men and 15 women, were included in the study. Their ages ranged from 51 to 91 years, with an average age of 75 years. Table 1 lists the operations performed, and Table 2 the more important observations on physical examination, other than those requiring surgical intervention.

One hour before the operation each patient was given a dose of atropine ranging from 0.325 to 0.65 mg. (1/200 to 1/100 gr.). The control respiratory rate of these subjects on arrival in the operating suite ranged from 14 to 24 (average 18.8). These measurements, as well as all other data pertaining to medication and pathologic data, are listed in Table 3. As can be seen from that table, each patient was given, as additional premedication, 1 to 3 mg. of levorphan tartrate intravenously (average 2.2 mg.). This was given not later than fifteen minutes prior to induction of anesthesia. The respiratory rate after premedication ranged from 14 to 22 (average 17.6).

Anesthesia was initiated with a dose of levorphan tartrate (given by intravenous drip*) which, in general, approximated that used as premedication, and nitrous oxide-oxygen anesthesia was instituted.** The anesthesia was maintained with the gas mixture, supplemented by additional amounts of levorphan tartrate as needed. Levorphan tartrate was administered either by continuous intravenous infusion or by intermittent doses. After a dose of levorphan tartrate ranging from 0.5 to 9 mg. (average 3.8 mg.) had thus been given within five to seventy minutes (average 21 minutes)—including the premedication, this corresponded to a dose of levorphan tartrate ranging from 1.5 to 12 mg., but

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*Ten mg. of levorphan tartrate to each 200 cc. of saline solution.

**Initially, the two gases were mixed at a ratio of 4 liters of nitrous oxide to 1 to 1.5 liter of oxygen, depending on the general condition and weight of the patient. The bag was allowed to fill up three times. Thus most of the nitrogen is removed from the patient and the anesthesia equipment, and the patient is saturated with a gas mixture containing 70 to 75 per cent of nitrous oxide. The ratio of nitrous oxide: oxygen for the maintenance of anesthesia was determined by the flow necessary to keep the bag filled. For instance, in the case of a 1,000 cc. flow the ratio was 500:500, representing approximately 70 per cent nitrous oxide and 30 pe cent oxygen apart from the amount of oxygen required fo the minimal metabolic needs (300 cc.).[5]

TABLE 3.—*Doses of Levorphan Tartrate and of Levallorphan Tartrate Given to 23 Surgical Patients; Respiratory Rates Prior to Anesthesia and After Administration of Opiate and Antagonist*

Case	*Patient*	*Sex*	*Age*	*Type of Operation*	*Initial R.R.**	*Levorphan Tartrate Premedication*		*Initial Levorphan** Supplementation*		*Resulting R.R.**	*Levallorphan Tartrate, Mg.*	*Time Onset of Effect*	*Resulting R.R.**
						Mg.	*R.R.* After Premedication*	*Mg.*	*Duration of Administration*				
1	H.M.	F	81	Hip nailing	16	2.5	14	4	25′	10	0.5	1½′	17
2	L.L.	F	83	Hip nailing	18	2	15	4	15′	6	0.5	1′	15
3	W.F.	M	77	Thompson hip arthroplasty	17	2	17	4	20′	6	0.5	½′	12
4	V.S.	M	79	Hip nailing	20	2	18	1	25′	12	0.2	½′	16
5	L.M.	F	91	Hip nailing	24	1	22	0.5	5′	10	0.3	¼′	18
6	M.R.	F	79	Hip nailing	18	2	18	2	15′	12	0.5	1′20″	18
7	McC.C.	F	78	Hip nailing	21	1	20	2	10′	12	0.3	40″	20
8	B.C.	F	81	Hip nailing	20	1	20	3.4	55′	8	0.5	1½′	20
9	H.D.	F	68	Hip nailing	18	3	18	6	33′	6	1.5	2′	12
10	O.R.	F	77	Hip nailing	17	2	17	3.5	17′	0	0.5	3′	12
11	H.M.H.	M	62	Hip nailing	18	3	18	6	15′	8	0.5	1½′	16
12	K.S.	M	51	Transurethral resection	18	3	18	9	26′	10	1	1′	18
13	P.J.	F	83	Cholecystojejunostomy	18	1	18	4.5	11′	8	0.5	¾′	18
14	L.H.	F	60	Excision of neuroma	18	3	14	5	12′	8	0.8	¾′	16
15	B.K.	F	69	Cholecystectomy	18	3	18	3	15′	6	0.5	30″	18
16	H.M.	F	59	Cutaneous ureterotomy	16	3	14	9	21′	8	1	45″	22
17	C.D.	M	65	Hip nailing	22	2	22	4	37′	12	0.6	45″	17
18	R.L.	F	89	Hip nailing	20	1.5	18	2.5	36′	12	0.4	1¼′	18
19	D.L.	M	85	Suprapubic cystotomy	18	2	16	2	11′	9	0.4	30″	18
20	G.E.	F	72	Hip nailing	18	2	18	5	33′	4	0.7	2′	16
21	S.J.	F	72	Hip nailing	24	3	20	3	70′	0	0.6	2′	16
22	L.W.	M	64	Closed reduction of ankle	22	3	18	2	5′	10	0.5	45″	22
23	M.I.	M	91	Transurethral resection	14	2	14	2	11′	12	0.4		12

*R.R. = Respiratory rate. (Respiratory rate measurements were made for all patients at five-minute intervals or more frequently whenever indicated during the entire course of anesthesia. The respiratory rates following the first levallorphan tartrate administration remained at the levels entered in the pertinent column until, after the "additional Levorphan supplementation," some of these rates dropped at the times indicated, to the values recorded in the table. Respiratory rates after the "additional Levallorphan tartrate" administration remained at least at the levels entered in the table until the patients left the operating room.)

**Levorphan = Levorphan tartrate

TABLE 3—(*Continued*)

Case	*Patient*	*Additional Levorphan** Supplementation* *Mg.*	*Additional Levorphan** Supplementation* *Duration of Administration*	*Resulting R.R.**	*Additional Levallorphan Tartrate, Mg.*	*Time Onset of Effect*	*Resulting R.R.**	*Total Levorphan,** Mg.*	*Total Levallorphan Tartrate, Mg.*	*Duration of Anesthesia*	*R.R.* on Leaving Operating Room*
1	H.M.	3.5	1 hr. 20′	15				10	0.5	1 hr. 45′	20
2	L.L.	2.5	1 hr. 10′	12	0.5	1½′	14	8.5	1	1 hr. 25′	14
3	W.F.	2.5	1 hr.	5	1.0	1′20″	14	8.5	1.5	1 hr. 40′	14
4	V.S.	1.8	1 hr. 5′	16	0.2	30″	20	4.8	0.4	2 hr.	20
5	L.M.	1	40′	14	0.3	45″	20	2.5	0.6	1 hr.	20
6	M.R.	2	30′	18				6	0.5	1 hr. 5′	18
7	McC.C.	2.4	50′	20				5.4	0.3	1 hr. 15′	20
8	B.C.			20[1]	0.5		20	4.4	1	2 hr.	20
9	H.D.	8	1 hr. 30′	12	0.5	1′	16	17.0	2	2 hr. 40′	16
10	O.R.	3	1 hr.	5	0.5	1½′	13	8.5	1	1 hr. 40′	14
11	H.M.H.	4	1 hr. 10′	8	1.5	1½′	15	13	2	1 hr. 45′	18
12	K.S.	3	17′	10	0.5	1′	18	15	1.5	1 hr. 10′	18
13	P.J.	2	29′	14	0.5	2′	15	7.5	1	1 hr. 50′	18
14	L.H.			16[2]				8	0.8	½ hr.	18
15	B.K.	3.5	37′	13	0.3	1½′	16	9.5	0.8	2 hr. 50′	20
16	H.M.	1	24′	22				13	1	2 hr. 5′	20
17	C.D.			20[3]				6	0.6	1 hr. 18′	22
18	R.L.			18[4]				4	0.4	1 hr. 28′	18
19	D.L.	1	10′	14	0.4	30″	16	5	0.8	50′	16
0	G.E.	5	56′	9	0.5	2′	16	12	1.2	2 hr. 55′	18
1	S.J.			20[5]				6	0.6	2 hr. 20′	20
22	L.W.			22[6]				5	0.5	15′	22
3	M.I.	2	16′	12	0.4	30″	16	6	0.8	1 hr. 10′	16

[1] Respiratory rate recorded 35′ before termination of anesthesia

[2] Respiratory rate recorded 10′ before termination of anesthesia

[3] Respiratory rate recorded 21′ before termination of anesthesia

[4] Respiratory rate recorded 46′ before termination of anesthesia

[5] Respiratory rate recorded 30′ before termination of anesthesia

[6] Respiratory rate recorded 5′ before termination of anesthesia

These rates remained at least at the levels recorded until the patients left the operating room.

usually exceeding 4 mg. (average 6 mg.) —the respiratory rate was considerably lower than the control value for all patients but 1 (Case 23).* It ranged from apnea to 17 (average 8.2).

Levallorphan tartrate, therefore, was injected into the tubing through which the opiate entered the circulation, or, in cases in which the opiate was given by intermittent injections, into the tubing through which dextrose or saline solution was administered. The dose of levallorphan tartrate ranged from 0.2 to 1.5 mg., but it was usually 0.5 mg. or more (average 0.57 mg.) Within one-quarter minute to three minutes (average 67 seconds) after administration of the antagonist, the respiratory rate rose to a range of from 12 to 22 (average 16.8), and levorphan tartrate was continued according to needs.

The additional dose of levorphan tartrate thus administered to 17 patients (6 patients did not require additional opiate supplementation) ranged from 1 to 8 mg. (average 2.8 mg.), and this was given over a period ranging from ten minutes to an hour and a half (average forty-seven minutes). The continuation of levorphan tartrate again, in the majority of instances, elicited some decrease in respiratory rate. In the 17 patients who were given additional supplementation it now ranged from 5 to 22 (average 12.9). A second dose of levallorphan tartrate, which ranged from 0.2 to 1.5 mg. (average 0.54 mg.) was given to 13 subjects whose respiration was thought to need support and to 1 patient (Case 8) whose respiratory rate was unimpaired, but who was in a very poor condition otherwise. Within an average of sixty-seven seconds after administration of the second dose of the antagonist, the respiratory rate again rose to a range of 13 to 20 (average 16.3).

The duration of anesthesia in the 23 patients ranged from fifteen minutes to two hours and fifty-five minutes (average one hour and thirty-six minutes), and the respiratory rate when the patients left the operating room ranged from 14 to 22 (average 18.3).

Blood pressure and pulse rate were recorded throughout anesthesia for all patients. Table 4 lists both the lowest and the highest readings of systolic and diastolic pressure, as well as the lowest and the highest pulse rate observed in each case.

Other observations during anesthesia may be summarized as follows:

The regimen employed was well tolerated. Nausea and vomiting were not encountered. One patient, however, became restless during the induction, and in this instance thiopenthal sodium was used in supplementation for five minutes. The patient became relaxed, and levorphan tartrate was successfully reinstituted. The abolition of respiratory depression with levallorphan tartrate was not accompanied by a decrease in depth of anesthesia. There was no change in body temperature. All patients slept a dreamless sleep from which, with a few exceptions, they could be aroused at any time during the operation. Questions were answered coherently and rationally, but there was no response to pain stimuli. When left alone, the patients went back to sleep. The pharyngeal reflex was abolished soon after initiation of anesthesia, and no difficulties were encountered in securing a patent airway. The laryngeal reflex was maintained in all cases during the entire course of anesthesia. Endotracheal intubation was attempted in 3 instances. In 1 it was easily accomplished without further medication, in spite of a slight spasm. In the 2 other cases a 2 per cent pontocaine spray made introduction of the endotracheal tube possible.

The pupils were constricted and oscillation of the eyeballs was present in most cases. Three patients showed flushing of the face and perspired freely, mainly in the face. Some patients exhibited muscular rigidity, but this was overcome by the administration of levallorphan tartrate. In the 2 cases of cholecystectomy (Cases 13 and 15) included in this series, levorphan tartrate and the antagonist provided sufficient relaxation for the exploratory and definitive operation. Succinylcholine chloride was used only for the opening and closure of the abdomen. There was no need for a muscle relaxant in the case of bilateral cutaneous ureterotomy (Case 16).

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*In this latter instance, the control respiratory rate was only 14 and this after a total of 4 mg. of levorphan tartrate dropped to 12.

As soon as the mask was removed, all patients were awake and were able to answer questions. They were returned to their wards without any complaint of pain.

The postoperative follow-up of this series by the Department of Anesthesia extended over seventy-two hours. During this period the following observations were made:

Upon returning to their wards, all patients continued a dreamless sleep for six to twelve hours. As during operation, the patients could be easily aroused from their postoperative sleep. There was no need for analgesic medication for twelve to twenty-four hours. Frequent determinations of blood pressure did not reveal significant changes, except in 1 patient: a 59-year-old woman (Case 16) soon after the induction of anesthesia, showed a severe drop in blood pressure. This, however, adjusted itself spontaneously, without intervention, within ten minutes. The drop in blood pressure recurred eight hours after termination of the surgical procedure. At this time the respiratory rate was 24, as against 16 prior to induction of anesthesia and 20 when the patient

TABLE 4.—*Range of Blood Pressure and Pulse Rates*

	Systolic Pressure		*Diastolic Pressure*		*Pulse Rate*	
Case	*Lowest*	*Highest*	*Lowest*	*Highest*	*Lowest*	*Highest*
1	130	170	72	100	60*	92
2	130	146	72	78	84	116
3	110	166	80	102	90	108
4	152	170	84	92	90	102
5	158	180	80	88	84	96
6	168	180	84	92	84	92
7	158	180	88	100	88	96
8	102**	158	64**	108	90	120
9	118	142	70	80	98	116
10	98	140	60	80	108	140
11	140	162	72	80	80	98
12	150	180	94	104	84	104
13	140	184	80	100	92	104
14	154	158	80	84	84	88
15	160†	220	60†	92	132	146
16	128	150	80	90	100	120
17	150	180	84	96	88	102
18	180	220	104	120	90*	140
19	144	160	78	88	72*	108
20	148	160	80	88	98	116
21	148	180	84	98	72	96
22	140	154	80	84	98	120
23	158	190	84	104	72	80
average	139.1	170.8	78.8	96	88	108

*Marked arrythmia due to auricular fibrillation, pulse rate changing continuously

**Drop in blood pressure due to blood loss (approximately 1000 cc.)

†Drop in blood pressure of short duration immediately after the delivery of a huge ovarian cyst

TABLE 5.—*Average Doses of Levorphan Tartrate and Levallorphan Tartrate and Average Respiratory Rates, Prior to Anesthesia and After Drug Administration, Recorded for 13 Surgical Patients Given Two Doses of the Antagonist*

Initial Respiratory Rate	*Levorphan Tartrate Premedication, Mg.*	*Initial Levorphan Tartrate Supplementation, Mg.*	*Resulting Respiratory Rate*	*Levallorphan Tartrate, Mg.*	*Resulting Respiratory Rate*	*Additional Levorphan Tartrate Supplementation, Mg.*	*Resulting Respiratory Rate*	*Additional Levallorphan Tartrate, Mg.*	*Resulting Respiratory Rate*	*Total Levorphan Tartrate, Mg.*	*Total Levallorphan Tartrate, Mg.*
18.1			7.4		15.4		11		16		
	2.15	3.88				3.02				9.05	
				0.58				0.55			1.13

left the operating room. Levophed, administered by intravenous drip, raised the blood pressure temporarily. After some improvement, the patient died with signs of shock, fifteen hours after completion of the operation. At autopsy, pulmonary embolism, originating from a thrombus in one of the leg veins, was determined to have been the cause of death.

Pulse rates of all patients remained essentially unchanged. As for respiration during the follow-up period, a decrease of the respiratory rate was observed in 5 instances, but only in 1 (Case 13) was it necessary to take supportive measures. The patient was an 83-year-old woman whose postoperative respiratory rate was 18. Two hours after termination of anesthesia this dropped to 11. For the sake of safety, 0.5 mg. of levallorphan tartrate, one-fifteenth the total dose of levorphan tartrate used during anesthesia, was administered intravenously. This, within half a minute, raised the respiratory rate to 18. In the other 4 instances the respiratory rates recorded on leaving the operating room dropped insignificantly for a short period, as follows: Cases 9 and 19, from 16 to 14; Case 11, from 18 to 14, and Case 17, from 22 to 18.

There was no indication of circulatory impairment that could have been attributed to the regimen employed. Similarly, there was no sign of an adverse effect upon renal or hepatic function in any of the patients. It is worthy of note that levorphan tartrate had no prolonged effect in the 2 patients with severe jaundice (Cases 13 and 15).

COMMENT

In the 23 patients studied, an average of 2.2 mg. of levorphan tartrate administered intravenously as premedication decreased the average control respiratory rate of 18.8 only insignificantly, to 17.6. After anesthesia was instituted, however, and after an additional average dose of 3.8 mg. of the opiate was given, i.e., after a total average dose of 6 mg., the respiratory rate fell to an average of 8.2—a drop of approximately 56 per cent.

An average dose of 0.57 mg. of levallorphan tartrate, or approximately 10 per cent of the average opiate dose given up to that time, increased the respiratory rate to an average of 16.8, a rate only slightly lower than the average respiratory rate after premedication (17.6).

The average additional dose of levorphan tartrate given to the 17 patients who required further supplementation was 2.8 mg., and this decreased the average respiratory rate from 16.3 to 12.9—a drop of approximately 21 per cent. The fact that this drop was much smaller than that preceding the administration of levallorphan tartrate suggests that the antagonist had also a protective effect against respiratory depression caused by further administration of levorphan tartrate.

The second dose of levallorphan tartrate administered to the 13 patients who needed further support of respiration again raised their respiratory rate to the average value after the first dose of the antagonist, i.e., before they had received further opiate supplementation.

The average respiratory rate of all 23 patients at the time they left the operating room (18.3) was practically identical with the average control rate before institution of anesthesia (18.8). The average total dose of levorphan tartrate given to these 23 patients was 8.1 mg., and the average total dose of the antagonist was 0.9 mg.

It is particularly interesting to review the data pertaining to the 13 patients who after the first dose of levallorphan tartrate required further supplementation with *levorphan tartrate and again support of* respiration with levallorphan tartrate (those in Cases 2, 3, 4, 5, 9, 10, 11, 12, 13, 15, 19, 20 and 23). For these, the average control respiratory rate was 18.1. An average total dose of levorphan tartrate dose (premedication plus initial supplementation) of 6.03 mg. decreased the average respiratory rate to 7.4—a drop of 59 per cent. An average dose of levallorphan tartrate amounting to 0.58 or 9.6 per cent of the levorphan tartrate dose given up to that time raised the average respiratory rate to 15.4—a satisfactory level. An additional average dose of 3.02 mg. of levorphan tartrate reduced the respiratory rate to an average of 11, and a second dose of the antagonist, averaging 0.55 mg., increased the respiratory rate to an average of 16. Thus the respiratory depression produced by an average total dose of levorphan tartrate, 9.05 mg., was satisfactorily counteracted by an average total dose of levallorphan tartrate of 1.13 mg., a ratio of 8:1. These data are summarized in Table 5.

Since during the postoperative period of observation the respiratory rate dropped significantly in only 1 patient, it must be assumed that levallorphan tartrate has a rather prolonged effect. It appears that levorphan tartrate-induced respiratory depression, whenever it occurs during nitrous oxide-oxygen anesthesia, can be effectively counteracted by a dose of levallorphan tartrate one-tenth to one-eighth that of the levorphan tartrate used. This ratio is of the same order of magnitude as that employed by Hamilton and Cullen[4] for the 3 patients of their series who were given the smallest amount of the antagonist in relation to the dose of levorphan tartrate used. In this connection it should be noted that Cullen and Santos,[6] at the recent Meetings of the Central Surgical Association in Detroit, reported observations on unanesthetized patients with chronic pain who were given levorphan tartrate and levallorphan tartrate in a ratio of 10:1 or 8:1, with a satisfactory analgesic effect and no depression of respiration.

Therefore, one may conclude that at this dose ratio levallorphan tartrate selectively antagonizes the depressing effect of levorphan tartrate upon respiration, without abolishing its analgesic action, both in anesthetized and in unanesthetized patients. As for the effect of the regimen on circulation, it can be seen from the figures given in Table 4 that changes in blood pressure and pulse rate are, if anything, less marked than the changes observed with nitrous oxide-oxygen anesthesia supplemented by cyclopropane, ether or thiopenthal sodium.

It will be noted that the combination of levorphan tartrate and levallorphan tartrate provided adequate supplementation to nitrous oxide-oxygen anesthesia also *for major abdominal operations*, without the disadvantage of respiratory depression. The fact that occasional muscular rigidity was overcome by levallorphan tartrate is in agreement with similar data reported by Hamilton[4] and Cullen.[6] It almost seems as though the spasmogenic action of the opiates is another untoward effect that can be counteracted by levallorphan tartrate. This aspect, however, will have to be investigated further.

SUMMARY AND CONCLUSIONS

Twenty-three surgical patients were given atropine and an average dose of 2.2 mg. of levo Dromoran tartrate (levorphan tartrate) in premedication. This had practically no effect on the respiratory rate. Nitrous oxide-oxygen anesthesia, supplemented by intravenous administration of levorphan tartrate, was instituted. After these patients had been given an average of 6 mg. (this figure includes premedication and supplementation) of the opiate, their average respiratory rate was reduced to 44 per cent of the average control rate. An average dose (0.57 mg.) of the opiate antagonist, levallorphan tartrate, raised the respiratory rate to a level only slightly lower than the average respiratory rate following the premedication. Seventeen patients required further supplementation and were given an additional average dose of 2.8 mg. of levorphan tartrate. The ensuing decrease in the respiratory rate was less marked than the drop previously observed. When a second dose of the antagonist was given to those patients who required further support of respiration, this was again attended by an increase of the respiratory rate.

The average respiratory rate at the time the 23 patients left the operating room was, for all practical purposes, identical with the control value. The average total dose of levorphan tartrate per patient was 8.1 mg. and the average total dose of the antagonist 0.9 mg. At this ratio of approximately 10:1 levallorphan tartrate did not decrease the depth of anesthesia. The combination of opiate and antagonist was well tolerated.

It is concluded that levo-3-hydroxy-N-allylmorphinan tartrate (levallorphan tartrate) effectively counteracts respiratory depression induced by levorphan tartrate. At a 10:1 ratio, the antagonist does not reduce the depth of nitrous oxide-oxygen anesthesia supplemented with levorphan tartrate. The observations suggest that the antagonist exerts some protective action against the respiration-depression effect of subsequent doses of levorphan tartrate. It is suspected that levallorphan tartrate counteracts the spasmogenic effect of the opiate. The combination of levallorphan tartrate and levorphan tartrate is well suited to supplement nitrous oxide-oxygen anesthesia.

RESUMEN

Se administró como premedicación a veintitrés pacientes quirúrgicos atropina y una dosis media de 2.2 mgr. de tartrato de levo Dromoran (tartrato de levorfan). No se observó ningún efecto sobre la frecuencia respiratoria. Se administró anestesia con óxido nitroso-oxígeno, a la que se agregó la administración intraveso de tartrato de levorfan. Después de haberse administrado a estos pacientes un promedio de 6 mgr. del opiáceo (esta cifra incluye premedicación y dosis suplementaria), se redujo el promedio de su frecuencia respiratoria al 44 por ciento del promedio de frecuencia observado. Una dosis media (0.37 mgr.) del opiáceo antagonista, tartrato de levorfan, aumentó la frecuencia respiratoria a un nivel solo ligeramente inferior al del índice de frecuencia respiratoria postpremedicación. Diecisiete pacientes requirieron más dosis suplementaria y les fué administrada una dosis adicional promedio de 2.8 mgr. de tartrato de levor-

fan. El descenso subsiguiente en la frecuencia respiratoria fué menos marcado que la caída observada previamente. Cuando hubo necesidad de dar una segunda dosis de la antagonista para reforzar la respiración, se produjo de nuevo aumento en la frecuencia respiratoria.

La frecuencia respiratoria en los veintitrés pacientes al dejar la sala de operaciones fué practicamente idéntica a la de los testigos. La dosis promedio de tartrato de levorfan por paciente fué de 8.1 mgr. y la dosis promedio del antagonista de 0.9 mgr. En esta relación 10.1, el antagonista no reduce la profundidad de la anestesia con óxido nitroso-oxígeno suplementada con tartrato de levorfan. Las observaciones sugieren que el antagonista ejerce alguna acción protectora en contra del efecto depresor de la respiración de dosis subsiguientes de tartrato de levorfan. Se sospecha que el tartrato de levorfan contrarresta el efecto espasmódico del opiáceo. La combinación de tartrato de levorfan y tartrato de levalorfan es bien seguida a la anestesia suplementaria con óxido nitroso-oxígeno.

RIASSUNTO

Ventitrè pazienti, che dovevano subire interventi chirurgici, furono premedicati con atropina e con 2,2 mg. (in media) di levo Dromoran tartrato (levorphan tartrato). Non si osservarono effetti sulla respirazione. Fu poi praticata l'anestesia con protossido d'azoto e ossigeno, somministrando in più levorphan tartrato per via endovenosa. Quando la dose dell'oppiaceo ebbe raggiunto (fra premedicazione e anestesia) i 6 mg. in tutto, la frequenza respiratoria dei pazienti si ridusse al 44% di quella di un gruppo di controllo. La somministrazione di una dose media di 0,57 mg. di un oppiaceo antagonista (levallorphan tartrato fece risalire la frequenza respiratoria a un livello appena più basso di quello esistente subito dopo la premedicazione. A diciassette pazienti si dovettero somministrare altri 2,8 mg. di levorphan tartrato, e allora si osservò che la diminuzione della frequenza respiratoria fu meno marcata di quella osservata con la dose primitiva. Somministrando poi una seconda dose di antagonista a quei pazienti che avevano bisogno di sostenere più validamente la respirazione, si osservò un ulteriore aumento della frequenza respiratoria. Al momento di lasciare la sala operatoria, la frequenza respiratoria media dei 23 pazienti era, praticamente, eguale a quella del gruppo di controllo. La dose totale di levorphan tartrato fu, per ogni paziente, di 8,1 mg.; quella dell'antagonista, di 0,9 mg. In tale proporzione, approssimativamente, di 10:1, il levallorphan non diminuí la profondità dell'anestestia. La combinazione dell'oppiaceo e dell'antagonista fu ben tollerata. Si può concludere che il levallorphan tartrato effettivamente combatte la depressione respiratoria causata dal levorphan tartrato. Nella proporzione di 10:1, l'antagonista non riduce la profondità dell'anestesia ottenuta con protossido d'azoto e ossigeno e rafforzata con levorphan tartrato. Le osservazioni fatte dimostrano che l'antagonista esercita un'azione protettiva controla depressione respiratoria prodotta daulteriore somministrazione di levorphan tartrato. Si può pensare che il levallorphan tartrato neutralizza gli effetti spastici indotti dall'oppiaceo. La combinazione di evallorphan tartrato e di levorphan tartrato ben si adatta come supplettivo della anestestia con protossido d'azoto e ossigeno.

RÉSUMÉ

Pré-opératoirement on administra à 23 malades de l'atropine et une dose moyenne de 2,2 mg. de tartrate de levorphan (levo Dromoran tartrate). Il n'y eut pratiquement aucun effet sur la fréquence respiratoire. On institua l'anesthésie au pro oxyde d'azote avec oxygène,

l'administration intraveineuse de tartrate de levorphan. Après avoir recu 6 mg. (en tout, pré- et per-opératoirement) de cet opiacé, la fréquence respiratoire a été réduite à 44 p. 100 de la fréquence normale. Une dose moyenne (0,57 mg.) de l'opiacé antagoniste, le tartrate de levallorphan, a augmenté la fréquence respiratoire à un niveau légèrement inférieur à la moyenne respiratoire constatée après l'administration pré-opératoire. Chez 17 malades on a dû administrer une dose moyenne supplémentaire de 2,8 mg. de tartrate de levorphan. La diminution de la fréquence respiratoire fut plus faible que celle observée auparavant. Quand une seconde dose de l'opiacé antagoniste fut donnée aux malades nécessitant une aide respiratoire, on constata une augmentation de la fréquence respiratoire.

La fréquence respiratoire moyenne des 23 malades, au moment de quitter la salle d'opération, était identique à la valeur de contrôle. La dose moyenne totale de tartrate de levorphan par malade a été de 8,1 mg.; celle de l'opiacé antagoniste, de 0,9 mg. A cette dose d'environ 10,1 mg., le tartrate de levallorphan n'a pas nui à la profondeur de l'anesthésie. La combinaison de l'opiacé et de son antagoniste a été bien tolérée.

En conclusion, le tartrate de levallorphan (levo-3-hydroxy-N-allylmorphinan tartrate) contrebalance effectivement la dépression respiratoire provoquée par le tartrate de levorphan. A la dose de 10:1, l'antagoniste ne réduit pas la profondeur de l'anesthésie au protoxyde d'azote avec oxygène complétée au moyen de tartrate de levorphan. Les observations font penser que l'antagoniste exerce une sorte d'action protectrice contre la dépression respiratoire provoquée par l'adjonction de doses de tartrate de levorphan. On pense que le tartrate de levallorphan contrebalance l'effet spasmogénique de l'opiacé. La combinaison de tartrate de levallorphan et de tartrate de levorphan est bien indiquée comme adjonction à l'anesthésie au protoxyde d'azote avec oxygène.

SUMARIO

Vinte e três pacientes cirúrgicos tomaram atropina e uma dose média de 2.2 mg. de "levo Dromoran tartrate" (levorphan tartrate) como pré-medicação. Não houve pràticamente alteração do rítmo respiratório. Anestesia protóxido de azoto —oxigênio suplementada pela administração endovenosa do "levorphan tartrate" foi usada. Depois dêstes pacientes terem recebido uma média de 6 mg. (incluida pré-medicação e suplementação) de opiáceo, o rítmo respiratória foi reduzido de 44% Uma dose média (0.57 mg.) de opiáceo antagônico e "levallorphan tartrate" aumentou o rítmo respiratório a nível pouco inferior à aquêle seguinte a prémedicação. Dezesete pacientes exigiram uma dose adicional média de 2.8 mg. de "levorphan tartrate." A diminuição subseqüente do rítmo respiratório foi menos acentuada do que a quéda prèviamente observada. Quando uma segunda dose de antagônico foi administrada àqueles pacientes que necessitaram de maior amparo respiratório, isto foi novamente acompanhado por um aumento de movimentos respiratórios.

A média de movimentos respiratórios de 23 pacientes, quando deixaram a sala de operação, foi de maneira geral idêntica ao valôr contrôle. A dose total média de "levorphan tartrate" por paciente foi de 8.1 mg. e a dose total média do antagônico de 0.9 mg. Na proporção aproximada de 10:1 o "levallorphan tartrate" não diminuiu a profundidade da anestestia. A combinação de opiáceo e antagônico foi bem tolerada.

Conclue-se que "levo-3-hydroxy-N-allylmorphinan tartrate (levallorphan tartrate)" realmente combate a depressão

respiratória induzida pelo "levorphan tartrate." Na proporção de 10:1, o antagônico não reduz a profundidade da anestesia protóxito de azoto—oxigênio suplementada pelo "levorphan tartrate." As observações sugerem que o antagônico exerce uma ação protetora contra o efeito depressor respiratório de subseqüentes doses de "levorphan tartrate." Suspeitase que o "levallorphan tartrate" contrabalança o efeito espasmódico do opiáceo. A combinação do "levallorphan tartrate" e "levorphan tartrate" é bem adequada para suplementar a anestesia protóxito—oxigênio.

ZUSAMMENFASSUNG

Dreiundzwanzig chirurgische Kranke erhielten als vorbereitende Medikation Atropin und eine durchschnittliche Dosis von 2,2 mg. Levodromorantartrat (Levorphantartrat). Dies hatte praktisch keinen Einfluss auf die Zahl der Atemzüge pro Minute. Darauf begann die Narkose mit Stickoxydul und Sauerstoff, ergänzt durch intravenöse Verabreichung von Levorphantartrat. Nachdem diese Kranken durchschnittlich 6 mg. (einschliesslich der Vorbereitungsdosis und der Ergänzungsnarkose) des Opiats erhalten hatten, sank die durchschnittliche Atmungsquote auf 44 Prozent der Durchschnittsquote bei Kontrollversuchen. Eine Durchschnittsdosis (0,57 mg.) des Antagonisten des Opiats Levallorphantartrat führte zu einer Erhöhung der Atmungsquote auf ein Niveau, das nur ganz wenig niedriger war als die nach der vorbereitenden Medikation beobachtete durchschnittliche Atmungsquote. Siebzehn Kranke brauchten eine weitere Ergänzungsnarkose und erhielten eine zusätzliche Dosis von durchschnittlich 2,8 mg. Levorphantartrat. Der darauf folgende Abstieg der Atmungsquote war weniger auffällig als der vorher beobachtete. Die Verabreichung einer zweiten Dosis des Antagonisten bei diesen Kranken führte wiederum zu einem Anstieg der Atmungsquote.

Die durchschnittliche Atmungsquote war bei den 23 Kranken beim Verlassen des Operationssaales praktisch die gleiche wie bei den Kontrollpatienten. Die durchschnittliche Dosis von Levorphantartrat betrug 8,1 mg. pro Patient und die durchschnittliche Gesamtdosis des Antagonisten 0,9 mg. pro Patient. Bei einem solchen Zahlenverhältnis von etwa 10:1 führte das Levallorphantartrat nicht zu einer Abflachung der Tiefe der Narkose. Die Kombination von Opiat und seinem Antagonisten wurde gut vertragen.

Es wird der Schluss gezogen, dass Levallorphantartrat (Levo-3-hydroxy-N-allylmorphinantartrat) die durch Levorphantartrat erzeugte Atmungsdepression wirksam bekämpft. Bei einem Verhältnis von 10:1 erfolgt keine Beeinträchtigung der Tiefe einer mit Levorphantartrat unterstützten Stickoxydul Sauerstoff-Narkose durch den Antagonisten. Die Beobachtungen weisen darauf hin, dass der Antagonist eine vorbeugende Wirkung auf den die Atmung deprimierenden Effekt zusätzlicher Dosen von Levorphantartrat ausübt. Es wird vermutet, dass das Levallorphantartrat die krampferregende Wirkung des Opiats bekämpft. Die Kombination von Levallorphantartrat und Levorphantartrat eignet sich gut zur Unterstützung der Stickoxydul Sauerstoff-Narkose.

Author's Note: Supplies of levo-dromoran tartrate and of the opiate antagonist levallorphan tartrate (Ro 1-7700) were made available through the courtesy of Dr. Leo A. Pirk of Hoffmann-La Roche Inc., to whom we are grateful for his additional efforts in connection with this project.

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Modern science is a wonderful thing. It spends a great deal of its time finding out that things everybody has always known are true.

From time immemorial milkmaids used to scald the insides of their milk-pails. They said it kept the milk from souring. The rational group among our forefathers smiled loftily at what they considered this quaint superstition. Then Pasteur came along and discovered that germs sour milk, and that scalding water kills germs. The milkmaids were exonerated.

The milkmaids also thought that thunder soured milk. They therefore put their cans in the cellar quickly if a thunder-storm threatened. In the cellar the milk was protected from the noise of the thunder. Another amusing superstition! Except that it happened to be the truth, and with the Pasteur explanation at hand it was pointed out that germs develop rapidly in milk at a certain high temperature. The little spell of heat just before a thunder-shower is just the right temperature for this development. If the milk is put in the cellar, it will be cooler and the germs will not have the proper temperature for development. Score another for the milkmaids!

Medical science has the same experiences. The Indians used to let epileptic members of their tribe be bitten by rattlesnakes. A good laugh in that for the unsuperstitious professors, but, lo and behold, we find an accepted and scientifically buttressed modern treatment for epilepsy is to inject snake venom or some other form of foreign protein under the patient's skin.

The inhabitants of Peru dosed a fever patient with the bark of a certain tree for fever. It was a religious ceremony until medical science proved that the cause of most of the fevers was malaria, and the bark, quinine, killed the malaria organism.

—*Clendening*

Surgical Treatment of Carcinoma of the Rectum and Rectosigmoid

Observations on 72 Operative Cases

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ALTHOUGH a good deal of improvement has been made in early diagnosis of carcinoma of the rectum, surgeons are still receiving patients in advanced stages of the disease. It is justifiable, therefore, to present a practical work on this topic, with a view to drawing it to the attention of surgeons in general.

Patients with carcinoma of the terminal portion of the digestive tract, before seeking the advice of specialists, usually waste considerable time in treating themselves, as if they were suffering from hemorrhoids or colitis. Many have already been in the hands of physicians not too well informed as to modern semeiology, who, without even an attempt to palpate the rectum, prescribe India nut and laxatives. Specialists, therefore, should try to interest general practitioners in the early abnormalities that indicate cancer of the large bowel. Certain symptoms are so frequently present that, when they occur in patients over 40 years of age, the examining physician should suspect cancer of the rectum until its absence has been proved beyond question. The main symptoms are rectal hemorrhage, abdominal discomfort and alteration of intestinal habitus, represented by diarrhea or constipation of the progressive type or by alternate constipation and diarrhea.

Cancer of the distal portion of the rectum tends to be cirrhotic and to diminish the intestinal lumen. Early diagnosis is always easily possible, since subjective symptoms are always present. Furthermore, in 80 per cent of the cases the lesion is accessible to rectal palpation, and in the remaining 20 per cent it can be visualized with the aid of the sigmoidoscope or by roentgen examination. In addition, carcinoma of the rectum develops slowly and consequently remains localized for a long time, this making it possible to employ radical therapy.

If physicians in general were "alerted" to an awareness of these facts, early diagnosis of rectal cancer would be made in a far greater percentage of cases. This is highly important from the therapeutic point of view. Under these improved conditions, patients erroneously labeled as having chronic appendicitis, hemorrhoids or amebic colitis would reach the surgeon less often. In my opinion, carcinoma of the rectum should be treated by a physician only after a careful specialized examination.

On the other hand, one should be constantly aware of certain rectal pathologic processes that simulate cancer, e. g., endometriosis. Soon after the founding of the Clinic at São Paulo about eleven years ago, a 43-year-old woman was laparotomized by a distinguished colleague of mine, and cancer of the rectum was diagnosed. As there was a generalized pathologic process

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Read at the First National meeting of the Brazilian Section, International College of Surgery, Sao Paulo.
Submitted for publication Feb. 16, 1954.

in the pelvis, the surgeon made an artificial anus. Two months later he performed a second operation with the object of amputating the rectum, which he did not do on account of the persistence of the same pelvic conditions and the unfavorable prognosis indicated thereby. A year and a half later the patient approached me and described what had happened. In my specialized examination I did not discover in the resected specimen any signs suggestive of tumor, but I did observe a fistulous orifice through which blood ran, especially during the menstrual period. My impression at that time was that the patient had acute salpingitis, with drainage into the rectum. Roentgen study confirmed the presence of the fistulous orifice, and on the basis of this diagnosis I proposed the administration of roentgen therapy by the adnexial process. The patient recovered completely from the supposed cancer and the symptoms totally disappeared, which surprised me. Since then, in view of the favorable evolution of the illness in this case, I have routinely reestablished the intestinal transit. On exploration of the small pelvis I observed a formation, apparently abnormal, that led me to perform a biopsy for histopathologic study. The result of this was the diagnosis of endometriosis.

The following symptoms of endometriosis should be remembered: sterility, relative or absolute; discomfort in the lower part of the bowel or in the pelvis during intermenstrual periods; pain or discomfort in the rectum during menstruation; rectal hemorrhage; dyspareunia; obstructions; rectal tenesmus, and rectal neuralgia. In addition, the rectovaginal septum often presents small cysts. The variety of abdominal tumors, together with any abnormality in the feces during the menstrual period, should suggest the possibility of endometriosis. Recently, in São Paulo, Dr. João de Lorenzo reported a case in which the facts here mentioned were confirmed.

The major factor in current successful surgical treatment of rectal cancer lies precisely in preoperative management. Preparation for surgical therapy can usually be accomplished within a week, and in many cases it is possible to start it at the patient's home. I regard as fundamental points (a) correction of anemia, (b) improvement of the patient's general condition by adequate nourishment and (c) establishment of fluid and electrolyte balance, with the use of vitamins in generous doses and of sulfas and antibiotics. Roentgen examination of the lungs, the spinal column, the pelvis and the roots of the members, the most frequent sites of metastasis, should be performed. One should always request the physician's aid in examination with the large apparatus, in order that one may have a clearer idea of the surgical risk and in order to make a wise choice of the surgical procedure. A Miller-Abbott sound should be introduced in order to avoid pressure on the sutures and to feed the patient.

Among the operative technics for extirpation of cancer of the rectum by the abdominoperineal route there are two schools of thought which contend for supremacy, the moot question being whether the sphincteric apparatus is to be sacrificed or is to be preserved. The possibilities are as follows:

1. Abdominoperineal amputation with creation of an artificial anus, which may be median or brought to the left iliac stump after the manner of Miles;

2. Abdominoperineal resection with maintenance of the sphincteric apparatus and lowering of the top end, or the end nearest the perineum;

3. Hartmann's technic, i. e., extirpation of the rectal segment with fixation of the portion next to the skin (abdominal anus)

and closure of the distal portion, which is covered with the pelvic peritoneum, and

4. Resection with immediate terminal anastomosis. This type of operation would be ideal for both surgeon and patient, but unfortunately it involves withdrawal of only a small portion of the tissue, leaving lymphatic zones that may already have been invaded by the neoplasm. Therefore, though resection with immediate anastomosis, as well as resection followed by intrasphincteric lowering, may bring success, neither should be performed except in cases of early, well localized tumor without lymphatic invasion; otherwise recurrence will be speedy. As for operations of the intrasphincteric type, stress should be laid on Eugene A. Gaston's statement, in his work *Fecal Continence Following Resections of Various Portion of the Rectum with Preservation of the Anal Sphincter,* that mere preservation of the sphincter cannot keep the patient continent. A patient operated on by Dr. Gaston stated that the perineal sensation which, prior to the operation, had indicated the need to defecate was no longer present. When the anal sensation was noticed the external sphincter voluntarily contracted, but by that time a certain amount of gas or feces had already escaped.

Abdominoperineal resection with creation of an artificial anus is the operation best suited to cancer of the middle (ampullary) or the lower (anal) portion of the rectum. For high tumors (rectosigmoid), resection with immediate reestablishment, or resection with lowering of the rectosigmoid portion to the anus, can be done. I fully agree with Lecene, who stated:

"Operations which are intended to extirpate a cancer from the rectum should be extremely ample to be efficacious. It is necessary to extirpate the whole cancerous intestinal zone and the whole meso rectum sigmoid and all its ganglia. It is not possible to remove these ganglia only by way of the perineum or by the perineum sacrum. If these perineal operations are unquestionably more benign because they are less shocking than the large abdominoperineal operations, I believe that on the other hand they are not satisfactory enough from a therapeutic view. The only long-time survivals take place after ample operations, with ablation of the whole meso rectum sigmoid."

Miles also stated that the operation of choice is the abdominoperineal one, since it is the only one that permits ablation of neoplastic tissues in the three zones of invasion: upward, downward and sidewise. In addition to this, it is the operation that facilitates good preparation of the ureters when these adhere to the neoplastic process without being invaded. In my opinion, therefore, only for well localized cirrhotic cancers, when exploration does not disclose adenopathy and when the amplitude of the colon-sigmoid permits good exeresis principally upward of and below the tumor, should the surgeon authorize the performance of a conservative operation. The studies of certain researchers indicate that the lymphatics of the high rectosigmoid are of abdominal origin and go to the median aortic ganglia. Thus, for tumors of the rectosigmoid there is no need of resection of the distal segment. This has great advantages; e. g., sexual potency remains, and intestinal transit is preserved.

With regard to the extent of intervention, I have said before, and I now repeat, that operative technics which are considered not merely radical but daring are justified. In the case of a patient judged unfit for operation and consequently doomed to die; in the case of a patient in whom the disease has spread to involve other organs, such as the stomach, the spleen or the pelvic organs, or in a case of cancer of the rectosigmoid, one should perform extensive resections as long as no distant metastases (to the lungs, vertebral column, etc.) are not present. In cases of "frozen pelvis" I have attacked the cancerous growth, endeavoring to accomplish the exeresis by operating at as great a distance as possible from any part of the primary lesion or its extensions, extirpating all nodules and lymphatic chains of the pelvis *en bloc* with the organs resected. Performed under these conditions, the operation often involves extirpation of the uterus and its adnexae, large ligaments all along the extension, vaginal tissues, lymphatic chains and areolar tissue of the primitive iliac, external iliac and hypogastric vessels. If there is vesical involvement, I perform bilateral implantation of the ureters into the colon above the terminal colostomy, extirpating the bladder and the urethra.

In order to accept this concept, which may appear daring even in the case of cancer considered beyond operative aid, it is necessary to maintain an open mind and thus permit the development of a new surgical conscience. Thus, it becomes necessary to do away with precepts hitherto considered unquestionable in abdominal surgery, such as the necessity for minute peritonization, since in these cases all the visceral serosa is removed from the small pelvis by the existence of numerous and extensive lymphatic connections among the ganglia situated along the large vessels of the lateral wall of the pelvis and the lymphatic chains and parametrial ganglia.

The human being is able to withstand such major operations only under rational treatment, whether before, during or immediately after the operation. Persuing new discoveries, which are likely to show up in this era of continued and renewed investigation and may bring about good results in the treatment of cancer of the rectum, it is necessary for surgeons to look for solutions which, within a certain period of time, will enable them to save the majority of their patients. At present one can only catch a glimpse of this possibility.

With the proposed operations, however, I am convinced of the possibility of reducing the cancer mortality rate so far as the rectum is concerned. Roentgen therapy offers nothing in the treatment of adenocarcinoma of the rectum.

SUMMARY

The author reemphasizes the vital importance of early diagnosis of malignant neoplasms of the rectum and rectosigmoid and the danger of confusing the early symptoms with those of less grave conditions. He considers roentgen therapy useless in the treatment of these lesions and recommends radical operation as the treatment of choice.

RIASSUNTO

L'autore richiama ancora una volta l'attenzione soll'estrema importanza della diagnosi precoce nei carcinomi rettali e sui danni che derivano dallo scambiarne i segni con quelli di affezioni meno gravi.

Vengono descrittte 3 tecniche operatorie: l'amputazione addomino-perineale, la resezione addomino-perineale e la resezione con anastomosi terminale.

Di ognuna vengono elencate le indicazioni.

La roentgenterapia è completamente inutile.

RÉSUMÉ

L'auteur souligne l'importance vitale du diagnostic précoce du néoplasme rectal, et le danger d'en confondre les symptômes de début avec une affection bénigne.

Il décrit trois techniques opératoires, en précisant leurs indications:

(a) amputation abdomino-périnéale;

(b) résection abdomino-périnéale;
(c) résection avec anastomose terminale immédiate.

L'auteur juge inefficace la roentgenthérapie dans les cas de cancer du rectum.

RESUMEN

El autor señala la importancia vital del diagnóstico temprano de los neoplasmas malignos del recto y el peligro de confundir sus primeros síntomas con aquellos de padecimientos menos graves. Se describen tres técnicas operatorias: (a) amputación abdóminoperineal, (b) resección abdóminoperineal y (3) resección con anastomosis terminal inmediata. Se dan las indicaciones para cada una. El autor considera sin valor el uso de la terapia roentgen en el tratamiento del cáncer del recto.

ZUSAMMENFASSUNG

Der Verfasser hebt von neuem die unerhörte Bedeutung der Frühdiagnose bei bösartigen Mastdarmgeschwülsten und die Gefahr der Verwechslung ihrer Symptome mit denen harmloserer Erkrankungen hervor. Er beschreibt drei chirurgische Verfahren: 1. die abdominoperineale Amputation, 2. die abdominoperineale Resektion und 3. die Resektion mit sofortiger terminaler Anastomose. Die Indikationen für jedes der drei Verfahren werden angegeben. Röntgenbestrahlungen zur Behandlung des Mastdarmkrebses hält der Verfasser für wertlos.

CORRECTION: In the November issue of the Journal, pp. 519-534, there appeared an article entitled *Hematoma of the Rectus Abdominis Muscle* by Drs. Max Thorek and Lauro B. DeVera. The Journal's attention has been called to the fact that the list of references appended thereto omitted mention of two important publications pertinent to the subject:

Halperin, G.: Spontaneous Hematoma of the Abdominal Wall, Surg., Gynec. & Obst. 54:861-863 (Dec.) 1928

Torpin, R.: Hematoma of the Rectus Abdominis Muscle in Pregnancy, Am. J. Obst. & Gynec. 46: 557-566 (Oct.) 1943

We are glad to publish these references as addenda to the article and offer our sincere apologies to the authors for their omission from the original presentation.

Adenomas of the Rectum and Colon: Surgical Management

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NUMEROUS excellent articles have appeared in the recent literature on adenomas of the colon and rectum. These have furnished information with regard to incidence, relation to malignancy, and treatment. The cause is still obscure. We should like to make a few observations and to report on a small series of cases observed during the past five years. The terms "adenoma" and "polyp" will be used as synonymous.

Incidence.—The reported incidence after physical examination varies from 5 to 17 per cent (Table 1). Nearly all of the patients were over the age of 40. The sex incidence was usually reported as 3 male to 2 female patients. Of 17,149 examinations, 1,665 (9.7 per cent) disclosed adenomatous polyps.

Table 2 shows a series of polyps of the rectum and colon reported as observed at autopsy. Using cases (not per cent) for calculation, 9.6 per cent of adenomas reported after 30,494 autopsies. Even after omitting the smaller series of 241 autopsies, in which 69 per cent were detected by use of a magnifying lens, the figures show polyps in 9.3 per cent of 30,253 autopsies. It is interesting that the average of large numbers of reported cases shows an incidence of 9.7 per cent adenomas found on simoidoscopic examinations, and an incidence of 9.6 per cent at autopsy. The figures prove nothing, but they suggest that about 10 per cent of adults over the age of 40 have polyps of the rectum and colon. A series of over 4,000 barium enemas, in less than 1 per cent of which adenomas were present, is mentioned only to support an observation that small polyps in the rectum proper cannot always be visualized by means of a barium enema.

Relation to Cancer.—Everyone is agreed that adenomas of the rectum and colon may become malignant. The only confusion is in terminology. What constitutes malignant change that requires radical resection? Does one diagnose cancer only when invasion is present? The histologic criteria presented by Swinton and Warren[1] in 1939 are rather widely cited. These authors stated that at least two of the three criteria (anoplasia, irregularity of architecture, and invasion) must be present before a diagnosis of cancer can be made, though they point out that lymphatic or vascular invasion alone means clinical malignant disease.

Bacon and his associates[2] subdivided adenoma into (1) benign (no change), (2) adenoma with atypism (irregularity of glands with cells two or three rows deep); (3) adenoma malignum or carcinoma *in situ* (irregularity of glands, hyperchromatosis, imbalance, mitosis, etc.), without invasion of the basement membrane, and (4) adenocarcinoma (invasion). They recommended local removal for the first two classifications and radical resection for the last two. Some difference of opinion exists concerning the treatment of carcinoma *in situ*. (This is poor terminology; the pathologist should be able to improve it.)

Submitted for publication Sept. 16, 1954

TABLE 1.—*Reported Incidence of Adenomas*

Authors	*Total Physical Examinations*	*Adenomatous Polyps*	*Percentage*
Bacon, H. E., Laurens, J., and Peal, A. R.: Histopathology of Adenomatous Polyps of Colon and Rectum, etc., Surgery 29.663-667, (May) 1951.	162	26	16
Fansler, W. A.: Adenomas of the Colon and Rectum. South Dakota J. Med. & Pharm. 1:268-272, (July) 1948.	256	38	14.9
Young, V. T.: Routine Examination of the Lower Bowel. Am. J. Surg. 81:18-24, (Jan.) 1951.	500	44	8.8
Jackman, R. J., and Mayo, C. W.: The Adenoma—Carcinoma Sequence in Cancer of the Colon, Surg., Gynec. & Obst. 93:327-330, (Sept.) 1951.	1,000	120	12
Hauch, E. W.; Buie, L. A.; Bargen, J. A., and Smith, L. A.: Adenoma of Rectum and Sigmoid Colon, Gastroenterol 16:669-673, (Dec.) 1950.	2,161	172	8
Christianson, H. W., and Tener, R. J.: Results of Sigmoidoscopic Examination at Cancer Detection Center: A 2 Year Study, Am. J. Surg. 81:14-17, (Jan.) 1951.	2,226	263	12.3
Diamond, M. Adenoma of the Rectum and the Sigmoid in Alcoholics, Am. J. Digest. Dis. 19:47-50, (Feb.) 1952.	5,980	348	5.8
Steele, H. H., and Brown, C. H.: Analysis of 1500 (Routine Proctosigmoidoscopic Examinations, Gastroenterol. 12:419-424, (March) 1949.	1,500	78	5.2
Enquist, I. F., and State, D.: Rectal and Colonic Polyps, Surgery 32: 696-703, (Oct.) 1952.	3,364	576	17.1
Total	17,149	1,665	9.7

Lockhart-Mummery and Dukes[3] classified polyps into (1) benign, (2) proliferating yet nonmalignant; (3) with microscopic foci of cancer; "carcinoma *in situ*," that is, "doubtful or suspicious"; (4) focal carcinoma (further growth of carcinoma *in situ* but definitely malignant), and (5) invasive carcinoma. These authors concluded that local treatment of all but the invasive type is adequate and reported 17 cases of "focal carcinoma" removed locally without recurrence. Turnbull and Fisher[4] reported 12 cases of noninvasive carcinoma (carcinoma *in situ* without invasion of the basement membrane) surgically excised or fulgurated, without recurrence, and cited 56 other comparable cases in the literature.

Klein and Scarborough[5] classified 100 patients into three groups: (1) those with benign tumor in frozen and permanent sections (77 patients); (2) those with tumors that were benign grossly and in frozen section but with small foci of malignancy in the permanent section (12

TABLE 2.—*Adenomas Reported After Autopsy*

Authors	*Autopsies*	*Percentage*
Boyd, C. E.: Polyps of the Colon, New Orleans M. & S. J. 104:92-96, (Sept.) 1951.	21,793	6
Helwig, E. B.: The Evolution of Adenomas of Rectum and their Relation to Carcinoma, Surg., Gynec. & Obst. 84:36, (Jan.) 1947.	1,460	10
Atwater, J. S., and Bargen, J. A.: The Pathogenesis of Internal Polyps, Gastroenterol. 4:395-408, (May) 1945.	241	69
Lawrence, J. C.: Gastrointestinal Polyps, Am. J. Surg 31:499-505, (March) 1936.	7,000	19.6
Total	30,494 (9.6%)	

TABLE 3.—*Reported Incidence of Malignancy in Polyps*

Authors	*Polyps*	*Malignant Change*	*Percentage*
Castro, A. F.; Ault, G. W., and Smith, R. S: Adenomatous Polyps of Colon and Rectum, Surg., Gynec. & Obst. 92:164-171, (Feb.) 1951.	352	53	15
Welch, C. E.; McKettrick, J. M., and Behringer, G: Polyps of the Rectum and Colon and Their Relation to Cancer, New England J. Med. 247:959-965, (Dec.) 18, 1952.	322	60	18
Sandusky, W. T., and Parsons, J. R.: Adenomatous Polyps of the Colon and Rectum, Am. Surg. 1935: 189-829, (June) 1952.	202	18	8.9
Turnbull, R. B, Jr., and Fisher, E. R.: Carcinoma in Rectal Polyps, Postgrad. Med. 12:303-307, (Oct.) 1952.	350	35	10
Klein, R. R, and Scarborough, R. A.: Diagnosis and Treatment of Adenomatous Polyps of Colon, Arch Surg. 65:65-71, (July) 1952.	100	23	23
DeMuth, W. E., Jr.· Cherney, P. J., and Fitts, W. T., Jr.: Adenomatous Polyps of the Colon and Rectum, Surg., Gynec. & Obst. 94:195-199, (Feb.) 1952.	234	36	15
Binkley, G. E.; Sunderland, D A.: Miller, C. J.; Stearns, M., and Deddish, M.: Carcinoma Arising in Adenomas of Colon and Rectum, J.A.M A. 194:1465-69, (April) 1952.	265	39	14.7
Green, W. W.: Polyps of Lower Sigmoid and Rectum, Ohio State M. J. 37:37-38, (Jan.) 1941.	70	10	14
Total	1,895	274 (14.4%)	

patients), and (3) those with lesions grossly benign or "suspicious," with malignancy in the frozen section (11 patients). The first 2 groups were treated with local excision (without recurrence); the last, by radical resection. Five of the 11 in Group 3 had pedunculated polyps without involvement of the pedicle but with lymph node metastases. The authors' definition of malignancy is not given, but such a diagnosis on frozen section usually means invasive carcinoma for which radical resection is indicated.

We agree with Ault[6] that approximately 15 per cent of all polyps are malignant upon initial detection (Table 3) and that about 15 per cent of colonic and rectal cancers show evidence of having originated in a polyp (Table 4). Ault further expressed the opinion that there is presumptive evidence that an additional 15 per cent of colonic and rectal carcinomas have their origin in adenomatous polyps.

Clinical Features.—Bockus[7] offered a good classification of colonic polyps, which is herewith condensed: (1) single, (2) multiple, either acquired or congenital (disseminated or familial) and (3) papilloma. The adenomas are either sessile or pedunculated, and at least 75 per cent are within reach of the sigmoidoscope. Since these potential cancers and early cancers can be detected so easily, and since thousands of persons in the United States die of cancer of the colon each year (22,860 persons in 1948), it seems safe to assume that at least half of those deaths could have been prevented by adequate examination when the patient was first seen. Far too many patients and doctors assume that blood in the stools means hemorrhoids, when all-out effort should be made to prove that it does not mean hemorrhoids.

Small adenomas are symptomless. The larger ones are prone to ulcerate or become traumatized, so that blood is mixed with or smeared on the stool. Intermittent diarrhea may be a suggestive symptom, and the larger pedunculated polyps may produce intestinal cramps.

TABLE 4.—*Incidence of Carcinoma Originating in Polyps*

Author	*Carcinoma*	*Origin in Polyp*
Swinton, E. W., et al[1]	827	14%
Bacon, H. E., et al[2]	800	15%

TABLE 5.—*Private Patients*

Examinations	*Patients with Adenoma*	*Percentage of Adenomas*	*Malignant Adenomas*	*Percentage Malignant Adenomas*
6142	504	8.2	45	9

TABLE 6.—*Malignant Polyps*

	No. of Cases	*Malignant*	*Percentage*
Rectal	442	33	7.5
Colon	62	12	19.3

Adequate biopsy should be made of the larger adenomas and of any small ones that appear doubtful. Any fixation or marked inflammation of small polyps should make one suspicious. Those on a long, thin pedicle can be removed with an electrocoagulating snare and the entire specimen submitted for microscopic examination. Those on a short, broad pedicle are best subjected to biopsy. In our experience, the latter appear more open to suspicion, because they usually have an irregular, lobulated surface. One section is not considered adequate biopsy material. At least three sections from different areas of the tumor must be taken, and taken as deeply as possible into the stroma. A section of surface epithelium means nothing. A good practice is to hold the tumor firmly but gently with the end of the proctoscope before taking the section, always bearing in mind that the bowel wall can be punctured.

Summary of Cases.—During the past five years we have examined 6,142 private patients (Table 5). Discussion of these patients will be brief, because we wish to deal mainly with the treatment of adenomas in general. Of this number there were 504 with one or more adenomas, an incidence of 8.2 per cent. Seventy-three patients had multiple polyps. There were 45 malignant adenomas, an incidence of 9 per cent. The average age of the adult patients was 56. There were 36 children under 12, 9 of whom were subjected to abdominal colotomy. There were 62 cases of polyps of the colon, in 12 of which the polyps were malignant, an incidence of 19.3 per cent (Table 6).

Treatment.—No hard and fast rules should be laid down for the treatment of adenomas. In general, it is our opinion that selection of the type of treatment depends upon the anatomic type of polyp, the size, location and number present, the pathologic report, and the age and general condition of the patient. The polyps that are reported as benign or those that show noninvasive carcinoma (carcinoma *in situ*) can be safely removed by the electrocoagulating needle or a snare. Those above reach of the sigmoidoscope are removed by performing an abdominal colotomy, at which time a frozen section can be done while the colotomy incision is being closed, followed by a radical resection if cancer is reported. Multiple polyps can be coagulated or snared through the sigmoidoscope passed through one or more colotomy incisions.

The presence of a long, thin pedicle should not give one a false sense of security, and radical resection should be done when invasive carcinoma is present, even though the pedicle is not involved. As has been stated, one should be suspicious of those on a short, broad pedicle and take repeated biopsies before local removal is advised. Small polyps (1 to 5 mm. in diameter) are usually sessile and need no biopsy. Moderately large polyps of 5 mm. to 1 cm. in diameter should be subjected to biopsy but are usually benign. Polyps over 1 cm. in diameter are usually pedunculated; biopsy or the snare is recommended, followed by section. Whenever possible we like to pull the pedunculated polyp gently into the proctoscope before snaring, because of the danger of engaging the bowel wall in the snare. Very large rectal polyps can be snared "piecemeal" if necessary; sigmoid polyps too large to be drawn into the end of the sigmoidoscope should be removed by colotomy. None of the larger polyps in our series approaches the size of one reported by Acuff.[8] This one produced sigmoid obstruction in a child 1½ years old, was successfully removed by snare, measured 3.5 inches (8.7 cm.) in diameter and had a pedicle (4¾ inches (12 cm.) long.

When one is forced to do as little as possible to patients debilitated by old age and disease, it is considered proper to snare large polyps from the sigmoid or to fulgurate large adenomas, even when invasive carcinoma has been reported. The latter is considered palliative surgical treatment, to which all surgeons must resort at times.

Polyps of the colon are rare in children but should be suspected when fresh blood is mixed with the stool. The majority occur in the rectum. They are usually single, nearly always pedunculated and almost always benign. We have never seen a malignant polyp in a child, but our series includes only 36 children. A note should be recorded about the mobility of the mucosa, particularly in children. More than once we have palpated a polyp on digital examination, tilted the table for proctoscopic examination and failed to find the polyp. At other times (few, it is true) we have failed to find a polyp previously seen in the upper part of the rectum.

There is no doubt that pedunculated sigmoid polyps can be found well down in the rectum at times. In each of 2 children in our series a large pedunculated polyp extruded; it was immediately ligated with ordinary twine, pushed back into the rectum and allowed to slough off.

Villous adenomas or papillomas are rare and at times assume huge proportions. One such tumor in our series filled the entire ampulla of the rectum and was reported as adenocarcinoma Grade I. A resection was done. Another papilloma 4 cm. in diameter, was attached to a hemorrhoid and became prolapsed at each stool. It was benign and was excised at the time of a hemorrhoidectomy. Biopsy f the finger-like projections can be miseading, since malignant changes can occur in the stroma near the base. Consequently, complete excision, with a cuff of mucosa, or thorough fulguration, including a cuff of mucosa, is advisable. Invasive carcinoma calls for radical resection.

No discussion of very large sessile adenomas was found in the recent literature. There were 3 cases in our series. One woman, age 44, had a sessile adenoma on the right wall of the rectum lying transversely; it measured 2.5 by 5.5 cm. and was 9 cm. from the anus. Biopsies on three occasions were reported twice as benign and once as adenocarcinoma *in situ*. Studies of the colon revealed no abnormality. The tumor was destroyed by electrocoagulation at six different sittings, and no recurrence had been observed after one year. A man aged 54, who had had three coronary occlusions, had a flat tumor 5 cm. in diameter and 10 cm. from the anus on the right wall. There was also a pedunculated polyp 2 cm. in diameter in the sigmoid. Roentgen examination of the colon otherwise gave negative results. The sigmoid polyp was snared and reported benign. Biopsy of the larger, sessile polyp was reported as showing "benign adenoma." The sessile adenoma was fulgurated five times, and there had been no recurrence after a year. The third patient was a man aged 77, who was said to have a "bad heart," who had a flat tumor 10 cm. from the anus, about 2.5 cm. wide and involving almost the entire circumference of the rectum. Biopsy was reported as showing adenocarcinoma Grade I, but because of the patient's age and infirmities, the tumor was fulgurated nine times. There had been no recurrence after four years. We consider it best to fulgurate the larger tumors several times rather than risk too deep fulguration and consequent penetration of the bowel.

Adequate follow-up examinations are urged upon all patients. These are advised at six-month intervals for several years, then at twelve-month intervals indefinitely. This includes sigmoidoscopic and barium enema studies.

SUMMARY

An average incidence of nearly 10 per cent of adenomatous polyps is reported after thousands of physical examinations. This figure closely parallels the average reported after thousands of autopsies.

The need for adequate biopsy material is stressed. Frozen sections of all polyps removed through abdominal colotomy incisions should be routine, after which radical resection should be done if invasive carcinoma is reported.

Approximately 75 per cent of adenomas are within the reach of the sigmoidoscope. Small adenomas, large benign adenomas, or lesions reported as "carcinoma *in situ*" can be safely removed with the electrocoagulating needle or snare. When invasive carcinoma is present, radical resection is almost mandatory.

All patients with adenomas should be urged to return for examination at regular intervals for an indefinite time.

RÉSUMÉ

Les auteurs rapportent une fréquence moyenne de près de 10% de polypes adénomateus, après des milliers examens. Ce chiffre correspond à celui constaté au cours d'un nombre à peu près égal d'autopsies.

La nécessité de la biopsie extemporanée est soulignée. Des coupes microscopiques congelées en séries de tous les polypes extirpés devraient être la règle, surtout dans les cas de carcinomes envahissants.

75% environ des adénomes sont visibles au rectoscope. Les petits adénomes, les grands adénomes bénins, ou les lésions dites "carcinome in situ" peuvent être extirpés de façon sûre au moyen de l'aiguille ou du serre-noeud électrocoaguant. En cas de carcinome envahisant, la résection radicale est toujors un devoir.

Tous les malades atteints d'adénome devraient être encouragés à subir des contrôles à intervalles réguliers.

ZUSAMMENFASSUNG

Unter tausenden von klinischen körperlichen Untersuchungen hat sich die Häufigkeit von adenomatösen Polypen des Dickdarms als durchschnittlich etwa zehn Prozent herausgestellt. Diese Zahl entspricht etwa den Ergebnissen von tausenden von Autopsien.

Die Notwendigkeit, ausreichendes Material zur histologischen Untersuchung mittels der Probeexzision zu erlangen, wird hervorgehoben. Alle durch eine abdominale Kolotomie entfernten Polypen erfordern sofortige Unterschung am Gefrierschnitt; radikale Resektion muss folgen, wenn ein in die Tiefe eindringendes Karzinom gefunden wird.

Ungefähr 75% der Adenome liegen innerhalb des bereichs des Sigmoidoskops. Kleine Adenome, grosse gutartige Adenome oder auch als "Carcinoma in situ" bezeichnete Geschwülste können ohne Gefahr mit Hilfe einer elektrokoagulierenden Nadel oder Schlinge entfernt werden. Handelt es sich um ein in die Tiefe eindringendes Karzinom, ist eine radikale Resektion unumgänglich.

Alle Kranken mit Adenomen müssen angehalten werden, sich auf unbestimmte Zeit in regelmässigen Abständen zur Nachuntersuchung einzufinden.

RIASSUNTO

Su migliaia di esami clinici si è avuta una frequenza media di circa il 10% di polipi adenomatosi—frequenza che coincide con quella riscontrata in migliaia di autopsie.

Viene sottolineata la necessità di avere un adatto materiale bioptico.

Dovrebbero essere di regola fatte sezioni al congelatore di tutti i polipi asportati chirurgicamente dal colon e far seguire resezioni radicali se si riscontra un tumore a carattere invasivo.

Il 75% degli adenomi, circa, si possono raggiungere col sigmoidoscopio. Piccoli adenomi, grandi adenomi benigni o lesioni del tipo di "carcinoma in situ" possono essere asportati con elettrocoagulazione.

Qualora sia presente un carcinoma a carattere invasivo è raccomandata la resezione radicale.

A tutti i pazienti con adenoma occorrerebbe far presente l'importanza di presentarsi per controllo, a regolari intervalli, per un tempo indeterminato.

RESUMEN

Se ha comunicado después de miles de exámenes físicos una incidencia promedio de cerca de 10 por ciento de pólipos adenomatosos. Cifra que guarda paralelismo con el promedio comunicado después de miles de autopsias.

Se ha señalado la necesidad de material de biopsia adecuado. Los exámenes por congelación de todos los pólipos extirpados a través de colostomías deben ser rutinarios y seguidos de extirpación radical si el resultado es carcinoma.

Aproximadamente el 75 por ciento de los adenomas están dentro del alcance del sigmoidoscopio. Los adenomas pequeños, los grandes adenomas benignos o las lesiones comunicades como carcinoma "in situ" pueden extirparse con seguridad por electrocoagulación con aguja o asa. Cuando se encuentra carcinoma la extirpación radical es obligada.

Todos los pacientes con adenomas deben citarse a exámenes regulares por tiempo indefinido.

SUMARIO

Após milhares de exames físicos, tem sido apresentada uma incidência média de quase 10% de polipos adenomatosos. Esta cifra acompanha paralelamente a média apresentada após milhares de autópsias.

Tem sido salientada a necessidade da biópsia com material adequado. Os exames por congelação de todos os polipos extirpados por colotomia abdominal deveriam ser rotina, sendo seguidos por ressecção radical, caso seja encontrado carcinoma.

Cêrca de 75% dos adenomas estão ao alcance do sigmoidoscoópio. Pequenos adenomas, grandes adenomas benignos, ou lesões citadas como "Carcinoma in situ" podem ser seguramente extirpados por meio da alça ou agulha de eletrocoagulação. Quando se trata de carcinoma infiltrativo, é quase obrigatória a ressecção radical.

Todos os pacientes com adenoma devem voltar para exame em intervalos regulares, por tempo indefinido.

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It must be remembered that we have only heard one side of the case. God has written all the books.

—*Smith*

Gastroscopy as an Aid in the Diagnosis of Extragastric Abdominal Disease

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GASTROSCOPIC study has something to offer in the diagnosis of extragastric abdominal disease, when such disease produces enlargement of the organ or a mass in the vicinity of the stomach. The stomach is so situated anatomically that, when blown up with air, it comes into contact with many of the important "abdominal disease regions." Gastroscopic examination, unlike contrast radiographic study, is a technic that in some patients permits one to induce maximum gastric distention without obscuring the finer configurational features. The diagnosis of extrinsic disease depends on recognition of total organ shifts and of localized pressure effects on the insufflated stomach. This is an indirect diagnostic method, and, if it is to lead to a specific diagnosis, it must be supplemented by considerable additional clinical information.

This paper deals with the anatomic relations of the stomach as the organ exists during gastroscopy, with the gastroscopic signs of diagnosable or detectable extragastric diseases, and with the method's frailties in this type of diagnostic situation.

Relations of Stomach During Gastroscopy.—The contour of the stomach during gastroscopy[1] is best illustrated pictorially (Figs. 1 and 2). It is important to understand that when the patient is lying in the left lateral position for gastroscopic study his inflated stomach assumes relationships which differ from those found at autopsy or following ingestion of a barium suspension. If the normal stomach is inflated with about 900 ml. of air and examined fluoroscopically with the subject upright, the stomach assumes a roughly discoid or globular form, which in the anterior-posterior projection appears as a circular shadow lying almost entirely to the left of the spine. Its configuration is governed largely by the left lobe of the liver, left diaphragm, spleen, paraspinal tissues, retroperitoneal structures, and anterior abdominal wall. If the subject is then examined lying on his left side, it is found that the stomach has become elongated and has migrated upward towards the anatomic right, along the underside of the liver. The shape of the stomach is now roughly tubular, and about three-quarters of it lies to the right of the midline. If the gastroscope is then introduced, the instrument's impingement on the greater curvature tends to draw the stomach back towards the left and to increase its caudad dimension (Figs. 1 and 2).

Throughout the maneuvers of gastroscopic examination it is apparent that the configuration assumed by the inflated stomach is governed only to a small degree by its own intrinsic anatomic form. The important controlling influence is found to be the pressures exerted by neighboring organs and structures. Some of these, such as the liver and the retroperitoneal structures, are immovable, while others, particularly the nearby bowel, give way readily before the insufflated stomach.

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Submitted for publication June 11, 1954.

The normal extrinsic pressures do not contribute irregularity to the internal gastric configuration, and, except for the prominent intrinsic landmark produced by the angulus and musculus sphincter antri, the stomach walls show no more than gentle undulation.

Abnormal extrinsic tumefactions may, of course, produce gastric defects of many sizes, shapes and locations. This is a process of simple impingement, not mural invasion. The important differential diagnosis for the gastroscopist is submucosal intramural tumor, and the decision is made largely on the basis of the rugal pattern and the effect of varying degrees of gastric insufflation on the appearance of the defect. Intramural tumors ordinarily cause obliteration of rugae over their summits, although rugae are commonly seen mounting toward the sides of such lesions. Extrinsic tumors merely push the normal-appearing mucosa inward, with little if any disturbance of the rugal pattern. Similarly, an intramural position is suggested if progressive gastric insufflation produces no apparent change in the shape of a tumor.

Pancreas.—The pancreas lies directly behind the insufflated stomach. All of the area occupied by the pancreas can be inspected indirectly by the gastroscopist; even the organ's head, in its entirety, under the conditions existing during gastroscopy. Circumscribed pancreatic tumors which protrude approximately 2 cm. or more from the surface of the organ may produce demonstrable indentations of the posterior gastric wall, if intervening peritoneal surfaces and the root of the transverse mesocolon do not enclose large amounts of fat. Large tumors that involve most of the pancreas may produce a general anterior shift of the posterior wall of the stomach.

Twelve patients with the autopsy diagnosis of carcinoma of the pancreas were examined gastroscopically at least six months before death, at a time when the diagnosis had not yet been established. Radiologic suspicion of pancreatic tumor had been obtained in seven prior to gastroscopy, and the gastroscopist was always aware of the roentgen data. In 2 patients the gastroscope could not be passed farther than the cardia; in 2 the examination was normal, and in 8 pressure defects were seen in the stomach. One could predict rather easily the portion of the pancreas primarily involved by location of the defect in the stomach. Thus, carcinomas of the head of the pancreas produced either anterior deflection of the antrum or indentation of the distal pars media, while those of the body and tail made their impressions higher in the pars media. In 1 patient the posterior wall of the stomach was not affected but the lesser curvature of the distal half of the pars media was depressed downward. Repeat gastroscopic examinations were made in 3 cases, at intervals of one, one and two months respectively after the first examination, and in none could any growth in the tumor be detected, on the basis of the size of the gastric defect.

One of the common causes of the gastroscopist's inability to pass the instrument much beyond the cardia is impingement of its tip against retroperitoneal tumors (Fig. 2). In 5 of the 12 patients with pancreatic carcinoma there was a hold-up or point of resistance below the cardia, and in 2 of these the instrument could not be passed farther.

Pancreatic cysts of any size at all displace the posterior wall as a whole, instead of producing a localized depression. In 2 instances of cysts of about baseball size, however, discrete infringements on the inflated gastric contour were observed. In 1 patient the pressure was exerted on the lesser curvature and posterior wall of the pars media. In the other the posterior

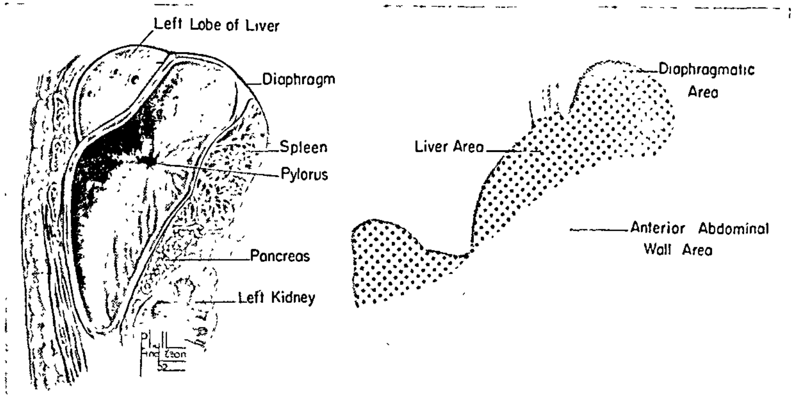

Fig. 1.—*Left,* anatomic sagittal section through stomach a little to the left of the path followed by the gastroscope. *Right,* configuration of normal stomach during gastroscopy. The anatomic relations of the anterior wall are indicated by the surfaces in contact with the insufflated organ.

wall of the antrum and the distal pars media was depressed.

Liver.—Moderate generalized enlargement of either lobe of the liver is ordinarily not detectable gastroscopically. Sometimes even remarkable diffuse hepatomegaly cannot be recognized as long as the cardia is not dislocated, although in such cases one may observe elongation of the vertical portion of the stomach.

The gastroscope may at times permit detection of liver diseases that alter the configuration of the underside of either the right or the left lobe. Cysts and primary and secondary tumors are important in this connection. In 3 patients the presence of metastases to the liver could be detected prior to death only by gastroscopic study. In 2 of these the lesser curvature of the pars media was depressed, and in the third the lesser curvature and the entire anterior wall of the pars media were pressed inward. It is questionable, however, whether plans for surgical treatment of a primary tumor should ever be altered solely on the basis of this indirect gastroscopic evidence of hepatic metastasis.

Left Leaf of Diaphragm.—Diaphragmatic tumors close to the esophageal hiatus usually prevent traverse by the gastroscope. If they do not, their presence may on occasion be recognized by depression of the fundus. But, as in the case of diffuse enlargement of the left lobe of the liver, strong suspicion of diaphragmatic tumor must exist prior to gastroscopic examination if the gastroscopist is to detect and confirm its presence (Fig. 3*A*).

Spleen.—Splenic enlargement practically always takes the form of generalized splenomegaly, and the resulting effect on gastric configuration is never that of a discrete localized defect. During a gastroscopic procedure the left lateral position of the patient encourages the inflated stomach to float upward, away from the spleen. It is for this reason that a considerable degree of splenomegaly may go unrecognized by the gastroscopist. Perhaps it is fair to state that the method has demonstrated no practical diagnostic importance as far as the spleen is concerned (Fig. 3*B*).

In patients with considerable and easily demonstrable splenomegaly who have been examined gastroscopically, only one type of gastric deformity has been observed. The posterior wall of the fundus has been displaced anteriorly, the superior portion of the fundus has been depressed, and the upper half of the stomach's greater curvature has been shifted medially. In its upper half, then, only the anterior and medial aspects of the stomach wall can be moved away from the gastroscope by insufflation. It is rather remarkable that the gastroscopist feels no sense of resistance in passing the instrument through the cardia in such cases.

Colon.—The relation of the stomach to the colon, particularly the splenic flexure, is variable from time to time in any person.[1] Defects produced by the normal colon on the configuration of the gastric greater curvature confuse the picture during roentgen examinations of the upper part of the gastrointestinal tract more often than idle contemplation of the matter might suggest (Fig. 4*A*). To the roentgenologist this is a well-recognized problem, but, in spite of alertness to the

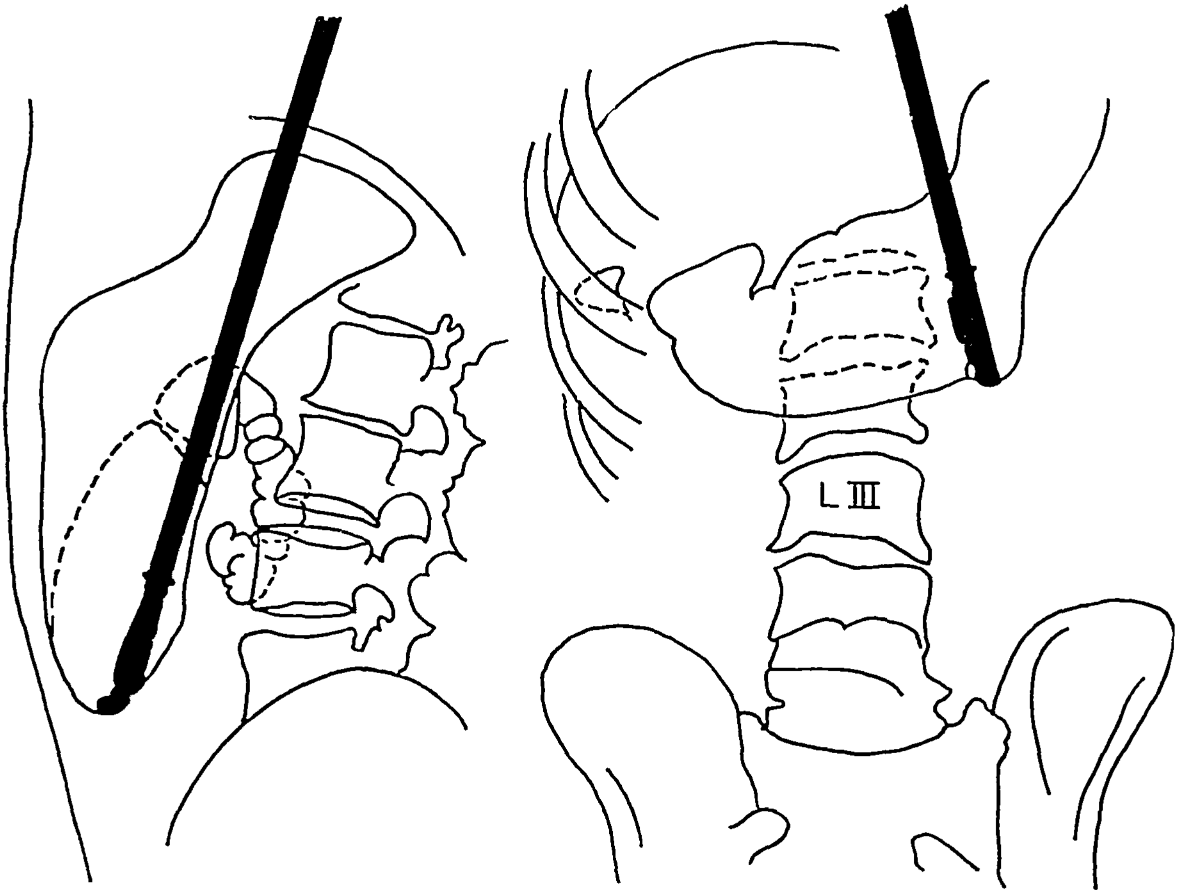

FIG. 2.—*Right*, tracing of roentgenogram taken in the anteroposterior projection during gastroscopic examination of normal stomach. The degree of inflation is about optimum for visualization of the pylorus, but it may be increased considerably for study of the contours of neighboring organs. *Left*, tracing of film taken in the lateral projection during gastroscopic examination of a normal stomach. The explanation of inability to pass the instrument in some cases of retroperitoneal tumor is apparent.

possibility, he and the clinician may at times be confounded in distinguishing between tumor of the greater curvature and extrinsic pressure by the normal colon. Gastroscopic study can then be of decisive diagnostic importance. In such cases a colon pressure defect cannot be found on the greater curvature, perhaps merely because the inflated stomach has floated away from the splenic flexure.

Retroperitoneal Lymph Nodes.—The gastroscope can play a most important role in detecting metastases to retroperitoneal lymph nodes, and, in fact, this is a facet of the course of certain malignant diseases which can properly be studied only gastroscopically, and by roentgenographic investigation following retroperitoneal air injection. Gastroscopic study easily and safely gives information with regard to the presence of large nodes in that part of the retroperitoneal area which is in contact with the inflated stomach. The spread of testicular, renal and intestinal tumors and the presence of abdominal lymphomatosis are probably the most important problems that can be clarified (Fig. 4*B*).

The gastroscopic signs of enlarged retroperitoneal nodes are similar to those produced by pancreatic tumors. Only nodes or node masses that are moderately large can be detected gastroscopically with assurance. The posterior wall of all or parts of the pars media and of the antrum is depressed to variable degrees. Occasionally the lesser curvature is involved. In the cases of 6 patients with testicular tumors in whose cases only gastroscopic investigation was able to demonstrate spread beyond the testes, the posterior wall of the middle portion of the pars media was depressed in 3, the whole posterior wall in 1, the lesser curvature and posterior wall of the antrum in 1, and the lesser curvature of the pars media in 1.

Kidneys and Adrenal Glands.—The right kidney and adrenal gland are outside gastroscopic range. The left come into indirect contact with the inflated stomach (Fig. 1), but gastric defects produced by their enlargement are difficult to recognize as such. The instrument lies in contact with the area posteriorly, and the gastroscopist has difficulty in evaluating pressure defects unless he can visualize them from a little distance. Furthermore, tumors of the left kidney and adrenal gland may be expected frequently to prevent insinuation of the gastroscope to the depth required for proper visualization of the region (Fig. 5).

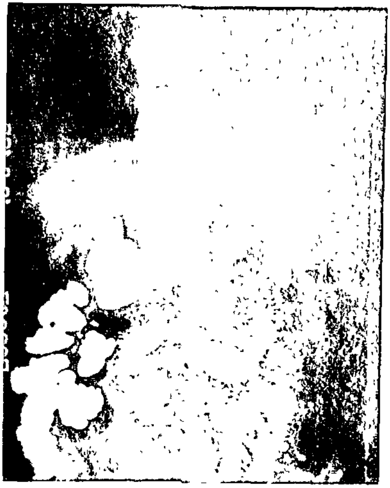

Fig. 5.—Tremendous tumor mass produced by metastatic involvement of left adrenal gland, secondary to bronchogenic carcinoma. The entire stomach has been shifted to the right, without discrete pressure defect. The gastroscope could not be passed into the stomach.

Arterial Aneurysms.—On occasion the gastroscopist may detect and recognize an aneurysm of the abdominal aorta or of the splenic artery. There are other very rare aneurysmal possibilities

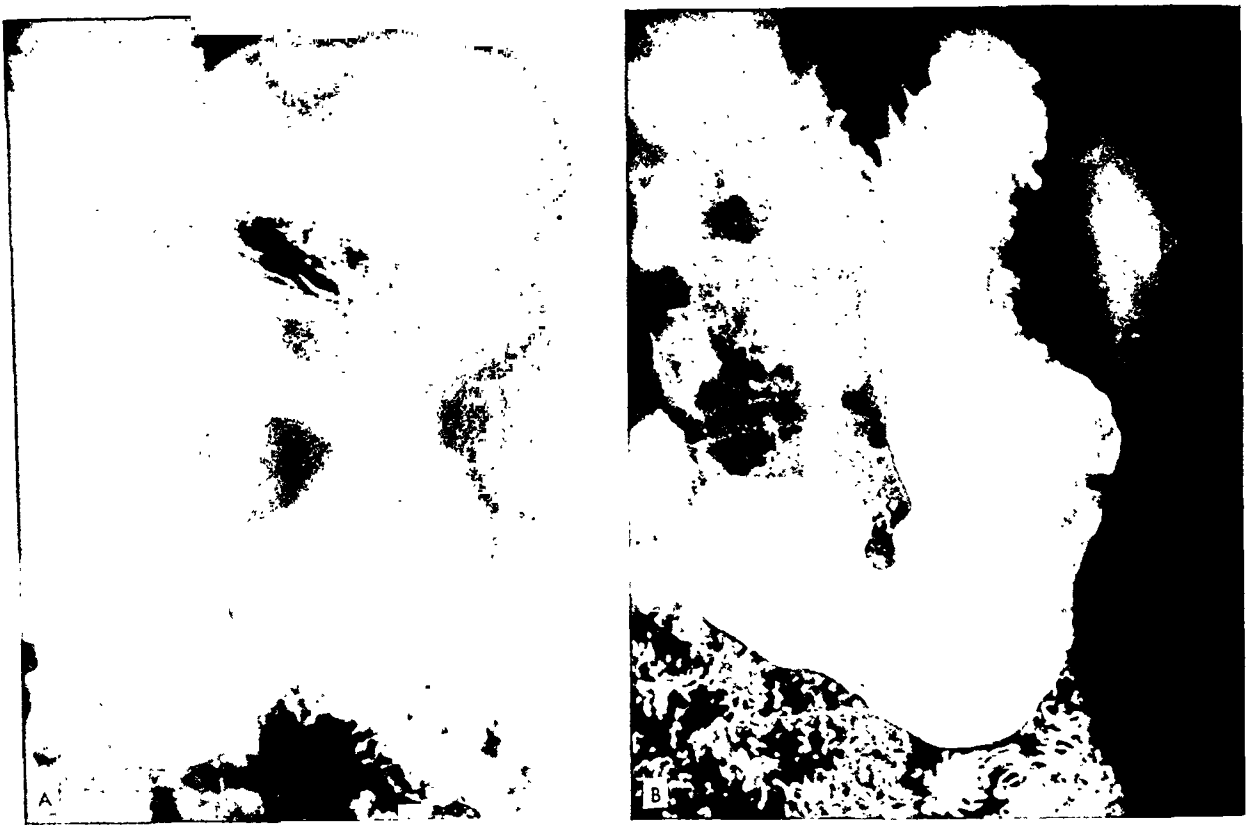

Fig. 3.—*A*, Large leiomyoma of left diaphragm depresses gastric fundus several centimeters. Although aware of the roentgen data, the gastroscopist concluded that the configuration of the cardia and fundus was normal. *B*, Splenomegaly secondary to portal hypertension, producing the usual type of roentgen defect on the greater curvature. Gastroscopically the stomach appeared normal.

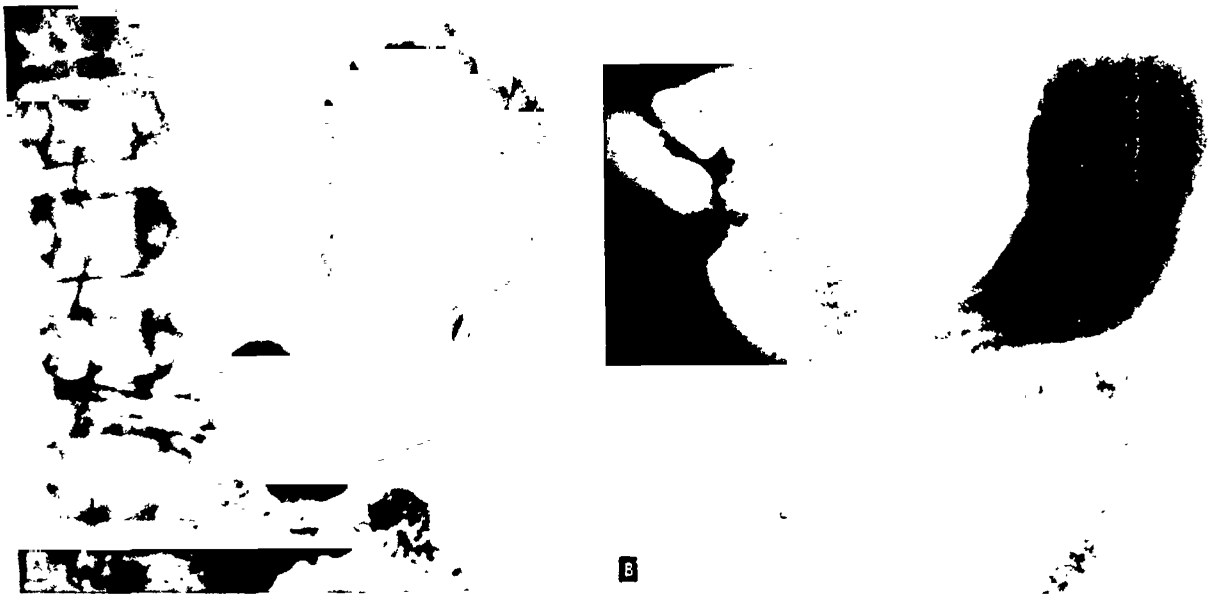

Fig. 4.—*A*, defect of middle portion of greater curvature due to pressure of normal colon. Because of persistence of the abnormality during fluoroscopic study, the roentgenologic interpretation was in doubt. Gastroscopically the configuration appeared normal. *B*, large pressure defect on pars media in patient with teratocarcinoma of testicle, at first believed due to pressure of normal spine. At gastroscopic examination the posterior wall of the entire pars media was observed to be depressed inward in a lumpy fashion. Autopsy showed extensive metastasis to the para-aortic lymph nodes, to the level of the diaphragm.

with the other branches of the celiac axis. If an aneurysm is suspected, gastroscopic investigation may well be considered contraindicated, although such a contraindication is only relative. As judged by the appearances presented by 5 aortic aneurysms observed gastroscopically, the gastroscopist cannot, in my opinion, expect to recognize expansile pulsation in such lesions.

SUMMARY AND CONCLUSIONS

The configuration of the inflated stomach as it is visualized during gastroscopic study is governed largely by the pressures exerted by neighboring organs and structures. Tumor-producing diseases in contiguous organs may be recognized by their effect on gastric configuration. Of the many diagnostic possibilities, detection of pancreatic tumors and tumor involvement of retroperitoneal lymph nodes is most important.

RESUMEN

La configuración del estómago insuflado conforme es visualizado durante el estudio gastroscópico depende grandemente de las presiones ejercidas por los órganos y estructuras anexas. Los padecimientos neoplásicos en órganos anexos pueden ser reconocidos por su efecto sobre la configuración gástrica. De las muchas posibilidades diagnósticas, las más importantes son los tumores pancráticos y las neoplasias de los ganglios linfáticos retroperitoneales.

RIASSUNTO

La forma dello stomaco dopo insufflazione durante gastroscopia è determinata dalla compressione esercitata dagli organi contigui. Tumori di tali organi possono essere svelati mediante le alterazioni della forma gastrica da essi prodotte. I più importanti, sotto questo aspetto, sono i tumori del pancreas e quelli dei linfonodi retroperitoneali.

RÉSUMÉ

Les pressions exercées sur l'estomac par les organes voisins ne donnent pas une image fidèle de la configuration de l'estomac insufflé durant la gastroscopie. Les tumeurs extra-stomacales peuvent être reconnues par leur empreinte sur la configuration gastrique, telles les tumeurs pancréatiques, les ganglions lymphatiques rétro-péritonéaux de nature maligne etc.

SUMARIO

A configuração doestômago inflamado, tal qual êle é visualizado na gastroscopia, é dependente das pressões exercidas pelos órgãos e estruturas vizinhas. O tumor produzindo doença na continuidade do órgão pode ser reconhecido pela alteração que produz na configuração gástrica. Das muitas possibilidades diagnósticas, os tumores do pâncreas e os tumores dos gânglios linfáticos retroperitoneais são os mais importantes.

ZUSAMMENFASSUNG

Die Form des Während einer Gastroskopie aufgeblasenen Magens hängt weitgehend von dem durch die Nachbarorgane ausgeübten Druck ab. Geschwulsterkrankungen angrenzender Organe können durch ihren Einfluss auf die Form des Magens erkannt wedren. Unter ihnen spielen die Geschwülster der Bauchspeicheldrüse und der retroperitonealen Lymphknoten die wichtigste Rolle.

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The Subcostal Incision in Renal Surgery

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THE surgical approach to the kidney to be discussed in this paper is the subcostal incision. The term is taken from a similar terminology used by the general surgeons for operations on the gallbladder and other upper abdominal organs. I have found no description of this incision for renal surgical procedures, but I am aware that the approach is old and suspect it has been forgotten by urologists. I became accustomed to this exposure by assisting the general surgeons and by performing lumbar sympathectomies.

The approach is simple, being made through an incision extending from or through the rectus muscle, directed laterally to the tip of the twelfth rib and then closely following the lower border of this structure for an inch (2.5 cm.) or so. The latissimus dorsi and oblique muscles are cut across and the transversus muscle separated in the direction of its fibers. The ilioinguinal and iliohypogastric nerves are easily avoided, as they practically always traverse a plane between the transverse and the internal oblique muscle about 1 cm. below the tip of the twelfth rib. By palpating the tip of the twelfth rib and making this the transverse plane of incision one can avoid injury to these nerves. The muscle attachment of the inferior surface of the twelfth rib is dissected or stripped from the rib. This provides sufficient exposure in the immediate area, but the incision can be enlarged to the erector lumbar muscles if need be. In most cases the rectus abdominis sheath and muscle need not be disturbed, but these structures can be cut across with impunity, with enlargement of the incision as much as necessary, even to exposure of the opposite kidney if desired. From this point the operation is carried on as with the conventional incision.

There are a few points concerning this incision that are worth of observing:

The operation is begun by incising down to the transversalis fascia at the margin of the rectus fascia and then inserting a finger under the transversalis muscle for a guide. This makes it possible to expose the area rapidly.

Before the fascia of Garota is opened, it is well to enlarge the retroperitoneal space about the kidney distal to the incision and posterior to the vertebral column. This is done by crossing the retroperitoneal space transversely, with the finger pushing the peritoneum medially.

In incising the fascia of Garota, it is wise to open well posteriorly and superiorly, for at first one is apt to go too far anteriorly and enter the peritoneal cavity —though this actually is no disgrace.

If a tumor is present and the removal of a kidney is anticipated, it is well to open the peritoneum before exposure of the kidney; pack off the abdominal structures, and identify the pedicle area transperitoneally. This accomplished, it is a comparatively easy matter to clamp the pedicle and remove the fascia of Garota, the perirenal fat and the kidney *in toto*. The posterior peritoneum in this area,

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From the Monroe Clinic.

Read at the Eighteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons.

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Submitted for publication Sept. 16, 1953.

though thin, is abundant and can be easily closed.

When the rectus muscle and fascia have been incised, care should be taken in closing to see that the inner fascial layer, as well as the outer, is properly approximated. The muscle may be disregarded.

This incision has a few disadvantages and many advantages as compared with the conventional one. The main disadvantages are as follows:

1. Exposure of the ureter below the proximal third is not so good. Even with the conventional incision this is frequently inadequate. It is my practice, when necessary, to expose the ureter at a low level in a renal operation, and to make a low McBurney incision for exposure in addition to the kidney incision. With the patient in the supine position this can be performed easily and quickly.

2. The peritoneal cavity will be opened inadvertently more often with this approach. Except in the presence of infection, however, this is of no concern. In fact, it is my practice to open the peritoneal cavity deliberately in all cases except those in which infection exists, and explore the abdominal cavity. I do this not to hunt down more surgical indications but for diagnostic purposes, though if additional surgical intervention is indicated, it is done. This gives the patient the benefit of a "first hand" examination of all the abdominal organs. Patients are grateful for this additional service.

The main advantages are as follows:

1. Positioning of the patient on the operating table is simply and quickly done, requiring no tape, straps, braces, flexing of legs, or pillows. The patient lies supine with the small of the back over the gallbladder or kidney elevator. This is raised to the desired height. The table may be broken a little also if desired.

2. The patient lies in a nearly natural position. Chest motion is unimpaired. Atelectasis is much less likely to occur, and there is less hindrance to the mechanics of circulation. Administration of the anesthetic is simpler.

3. The exposure is excellent and adequate for almost all renal surgical procedures. At first I considered it suitable only for thin patients, but with more experience I find it is better than the conventional incision for the obese patient, a type that is difficult to operate upon through any incision.

4. This exposure permits a thorough systematic abdominal examination. Structures adjacent to the kidney are identified and packed off, so that they need not be injured.

5. It is the most direct approach to one of the most important structures in renal surgery, namely, the kidney pedicle. Control of the blood supply is one of the first mandatory steps to be taken in performing a nephrectomy.

6. The exposure and position are easier for the assistants and nurses. Instruments do not keep sliding off a ridge. The self-retaining retractor, (Belfour) hangs in the wound in the position desired by the surgeon.

7. The wound closes easily and heals firmly, and there is far less postoperative wound discomfort. Also, I am sure there are fewer postoperative complications.

8. Both kidneys may be exposed and operated upon through one incision, without change of drapes or the position of the patient.

SUMMARY

Attention is called to the advantages of an old and apparently forgotten surgical approach to the kidney. The technic is described, and its advantages and disadvantages are listed.

RESUMEN

Se señalan las ventajas de una vía quirúrgica vieja y aparentemente olvidada para el riñón. Se describe la técnica y se enumeran sus ventajas y desventajas.

RÉSUMÉ

L'auteur attire l'attention sur une vielle technique chiurgicale apparemment tombée dans l'oubli. Il en cite les avantages et les désavantages.

RIASSUNTO

Viene richiamata l'attenzione sui vantaggi di una via di accesso al rene, caduta in disuso; ne vengono descritti la tecnica e i vantaggi.

ZUSAMMENFASSUNG

Es wird auf die Vorzüge eines alten und offenbar in Vergessenheit geratenen chirurgischen Zugangsweges zur Niere hingewiesen. Die Technik des subkostalen Einschnitts wird beschrieben und die Vorzüge und Nachteile des Verfahrens werden aufgeführt.

Most of the ethical philosophies of the past have sought to isolate the goods of life and to make one or another of them supreme: they have looked upon pleasure or efficiency or duty or sacrifice or imperturbability or self-annihilation or decorum as the chief end of a disciplined and cultivated spirit. Since no one goes through the world unhurt, and since violence and injustice have often had the upper hand, they have sometimes sought by a system of supernatural bookkeeping to redress the evils of earthly existence in another sphere; but to seek pleasure or immortality or happiness has been the common goal of these faiths—if not now, then hereafter.

There is no sanction in my philosophy for any single set of ends or goals. The fact that sunshine is beneficial to the body does not make the Sahara an ideal place to live in; and no single principle will produce an harmonious and well-balanced life. Values emerge from life at all its levels: there is virtue, as Plato saw, in the good shoemaker, quite as much as there is in the philosophic guardians of the Republic; and just as a well-organized state would destroy the foundations of its existence.

—*Mumford*

Maternal Posture for Correction of Posterior Fetal Position

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THE subject of this paper is a simple and, I believe, an original technical procedure. So far as I know, nothing has been published on the subject, and in questioning my associates I have been told that none of them has tried or even heard of a similar practice.

The idea came to me one evening when I was confronted with a primipara in active labor of about twenty-four hours' duration. The patient was in pain, tired and disgusted; the os uteri was dilated about 2½ fingerbreadths. The patient's relatives were importuning me to "do something," and I myself was dreading a second night of worry over the patient's slow progress. The diagnosis of a posterior presentation was simple—the questionable results of abdominal palpation, the character of the pains, the fatigue of the uterus and, finally, the results of vaginal examination confirmed it. As to the physiologic aspects of the case, I knew that the fetus lay on its back along the "hump" afforded by the vertebral bodies. The back of the fetus being the heaviest part and the mother being in the supine position, the baby was not likely to turn of its own accord and would have no little difficulty in getting its shoulders past the "hump" if it did turn.

From the preponderance of anterior positions encountered in obstetrics, it can be safely assumed that the anterior position is the posture of choice for all fetuses. Why not, then, try to help the child in assuming its natural position?

With this in mind, I directed the patient to turn over and assume the crouch or crawl position, on her knees and elbows. I suggested that she stay in that posture as long as she could. Five minutes later I found her lying on her side and having much stronger pains. To shorten the account of this particular labor, the patient was on the table and ready for delivery, with the fetus in the right occipital anterior position, within three hours.

As physicians were taught many years ago, the character and duration of labor depend on "the Powers, the passage and the passenger." The importance of the Powers and the size and direction of the passage were obvious, but in my opinion the attitude of the passenger was not given sufficient study. I am convinced that the thrust of the uterus and strength of the accessory muscles is greatly enhanced by the natural anterior position of the fetus. This, of course, is not news to anyone practicing medicine's first and most important art.

For about a year I resorted to this procedure with every lagging labor and was so impressed with the results that I asked some of my colleagues to try it. Most of them have become devotees. Because of its simplicity, safety and effectiveness, however, the procedure soon got out of hand; I found the nurses getting the patients into the knee-elbow position of their own volition!

In order to come to some d [illegible] clusion, I recorded ob [illegible]

Read at the Eighteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, New York, Sept. 13-17, 1953.
Submitted for publication Oct. 19, 1953.

private patients in my practice, the data including the duration of labor at the first examination or the examination in which I had been able to determine the position of the fetal skull in the true pelvis. For the sake of simplicity, this stage and the stage at which the patient was asked to try the knee-elbow position were recorded as the same (Table 1). At this time also I recorded the extent of cervical dilation and, of course, the position (right or left occipital) of the fetus. Finally, the further duration of labor to the time of delivery and the position of the fetal head at the vulva were recorded.

This report covers only ten months' experience. To those skeptics and critics who may claim that the whole idea hinges on my ability to determine fetal position I can say only that, in the first place, I am not exactly a novice; in the second place, this is a preliminary report on a small series, and in the third place, I am suggesting only a safe and simple method of correcting fetal position, in the hope of reducing the duration of labor. Since the benefits derived from this method are as valuable to me as to the patient, I have tried to be as honest as is humanly possible. Roentgenograms were not taken, because the patients were all private patients who would probably have objected to the expense; moreover, many would have insisted on unnecessary and time-consuming explanations.

The aforementioned statistics were recorded in a series of 240 consecutive deliveries, with 27 instances of employment of the knee-elbow posture. In 25 of the latter the technic resulted in delivery by anterior presentation. In only 2, or 4.7 per cent, did the procedure fail; in both of these the patients were primigravidae. There were 19 cases in which manual rotation was employed, the posterior presentation not having been diagnosed until full dilation had occurred or the time for delivery had arrived. Therefore, all in all, there were 40 cases among the 240 in which labor began with the fetus in posterior presentation.

In those cases in which the membranes were ruptured artificially at the time of examination I have included this point; in all others the membranes either ruptured spontaneously or were finally ruptured artificially to induce labor. It is true that simple rupture of the membranes as a rule will improve the labor and shorten its course, but the small number of cases in which this occurred in my series does not alter to any material extent the overall advantage of the method or the conclusions of this report.

It can be argued that the total duration of labor was not shortened, but the fact that, in 25 out of 27 cases, rotation of the fetus from the posterior to the anterior position was successfully accomplished is, in my opinion, significant. In short, here is a safe, simple maneuver that costs nothing and rarely fails to stimulate a lagging labor due to posterior presentation.

SUMMARY

To improve and shorten labor when the fetus occupies a posterior position, the author recommends a simple change in the posture of the woman in labor, which has proved extremely useful to him and beneficial to his patients.

TABLE 1.—*Summary of Data*[4]

Case	*Patient*	*Gravida*	*Duration of Labor at Time of Examination, Hr.*	*Duration After Knee-Elbow Position, Hr.*	*Manner of Delivery*	*Rotation of Fetus*
1	Mrs. B.	1	16 (12 posterior; rupture of membrane)	4	Normal	ROP to ROA
2	Mrs. D.	2	12 (9 posterior; dilation of 2 fingerbreadths)	3	Normal	LOP to LOA
3	Mrs. H.	2	12 (8 posterior; dilation of 3 fingerbreadths)	4	Normal	LOP to LOA
4	Mrs. D. G.	2	12 (10 posterior; dilation of 3 fingerbreadths)	2	Normal	ROP to LOA
5	Mrs. B. (twins)	2	20 (16 posterior; dilation of 3 fingerbreadths)	4	Low forceps	LOP to LOA
6	Mrs. H.	3	20 (16 posterior; dila- of 2 fingerbreadths; membrane artificially ruptured)	4	Low forceps	ROP-ROA
7	Mrs. K.	1	9½ (6½ posterior; dilation of 2 fingerbreadths; labor induced by rupture of membrane)	3½	Low forceps	ROP-ROA
8	Mrs. B.	1	18½ (14 posterior; dilation of 3 fingerbreadths; labor induced by rupture of membrane)	4½	Low forceps	LOP-LOA
9	Mrs. B.	2	11 (9½ posterior; dilation of 2 fingerbreadths)	1½	Low forceps	LOP-LOA
10	Mrs. D.	2	8 (7 posterior; dilation of 4 fingerbreadths)	1½	Normal	LOP-LOA
11	Mrs. C.	2	12 (9 posterior; dilation of 3 fingerbreadths)	3	Low forceps	LOP-LOA
12	Mrs. McK.	1	6 (3 posterior; dilation of 2½ fingerbreadths)	2	Low forceps	ROP-ROA
13	Mrs. C. (Chinese)	2	5 (4 posterior; dilation of 2½ fingerbreadths)	2	Low forceps	ROP-ROA
14	Mrs. H.	5	10 (Knee position used throughout labor; posture diagnosed abdominally; 4 previous labors with manual rotation)		Low forceps	LF-LOA
15	Mrs. R.	2	9 (5 posterior; dilation of 2 fingerbreadths)	4	Low forceps	ROP-ROA
16	Mrs. W.	2	30 (2½ posterior; dilation of 2½ fingerbreadths; membrane ruptured artificially to induce labor, because of toxemia)	6	Low forceps	[illegible]

TABLE 1 (*Continued*)

Case	*Patient*	*Gravida*	*Duration of Labor at Time of Examination, Hr.*	*Duration After Knee-Elbow Position, Hr.*	*Manner of Delivery*	*Rotation of Fetus*
17	Mrs. McK.	1	27		Midforceps; episiotomy	Manual rotation ROP-ROA
18	Mrs. C.	1	15 (10 posterior; dilation of 4 fingerbreadths; membrane ruptured artificially)	5	Normal	LOP-LOA
19	Mrs. V. D. M.	1	13 (10 posterior; dilation of 2½ fingerbreadths; membrane ruptured artificially)	3	Low forceps	LOP-LOA
20	Mrs. M.	1	12		Low forceps; episiotomy	Manual rotation ROP-ROA
21	Mrs. B.	1	36 (33 posterior; dilation of 3 fingerbreadths)	3	Normal	LOP-LOA
22	Mrs. W.	2	11 (5 posterior; dilation of 2 fingerbreadths)	6	Normal	LOP-LOA
23	Mrs. O.	1	15 (12 posterior; dilation of 2 fingerbreadths)	3	Low forceps	LOP-LOA
24	Mrs. B.	2	11 (8 posterior; dilation of 2 fingerbreadths)	3	Normal	ROP-ROA
25	Mrs. R.	1	6 (5 posterior; dilation of 2 fingerbreadths; membrane ruptured artificially)	1	Low forceps	ROP-ROA
26	Mrs. C.	2	Transverse arrest at full dilation	1	Low forceps; ROA	
27	Mrs. A.	1	8½ (6 posterior; dilation of 2 fingerbreadths)	2½	Low forceps	LOP-LOA

**Position confirmed in all cases by vaginal examination. Knee position attempted in 27 cases, with 25 successful rotations. Membranes ruptured artificially in 5 cases at diagnostic examination and in 3 cases for induction of labor.*

TABLE 2.—*Patients Studied; Manner of Delivery*

Gravida	*No. of Patients*	*Normal Deliveries*	*Low Forceps Deliveries*	*Midforceps Deliveries*
1	12	3	8	1
2	13	6	7	0
3	1	0	1	0
4	1	0	1	0

TABLE 3.—*Average Duration of Labor Before and After Assumption of Knee Position; Average Dilation at Examination*

	Average Duration Before Assumption of Knee Position	*Average Duration After Assumption of Knee Position*	*Average Dilation when Examined*
Primigravidae	11 hr. 2 min.	3 hr. 1 min.	2⅔ fingerbreadths
Multigravidae	9 hr. 30 min.	3 hr. 15 min.	2¾ fingerbreadths

RESUMEN

El autor recomienda un cambio simple de posición en la mujer parturienta, a fin de mejorar y acortar el parto cuando el feto está en una posición posterior, de acuerdo con su experiencia este cambio ha probado ser extremadamente útil y benéfico para el paciente obstétrico.

ZUSAMMENFASSUNG

Zur Erleichterung und Abkürzung der Wehen bei der posterioren Lage empfiehlt der Verfasser eine einzige Lageveranderung der Frau während der Entbindung, was sich in seiner Erfahrung als ausserst nützlich erwiesen hat.

RIASSUNTO

Per favorire e abbreviare il travaglio quando il feto è in posizione posteriore l'autore raccomanda di mettere la partoriente in un particolare atteggiamento che si è dimostrato molto adatto.

RÉSUMÉ

En vue d'améliorer et d'abréger le travail de l'accouchement lorsque le foetus se trouve en position postérieure, l'auteur recommande un simple changement de position de la femme. Son expérience lui a prouvé la grande utilité de cette mesure, et les avantages qu'en ont retirés ses malades.

When Benjamin Franklin invented the lightning-rod, the clergy, both in England and America, with the enthusiastic support of George III, condemned it as an impious attempt to defeat the will of God. For, as all right-thinking people were aware, lightning is sent by God to punish impiety or some other grave sin—the virtuous are never struck by lightning. Therefore if God wants to strike anyone, Benjamin Franklin ought not to defeat His design; indeed, to do so is helping criminals to escape. But God was equal to the occasion, if we are to believe the eminent Dr. Price, one of the leading divines of Boston. Lightning having been rendered ineffectual by the "iron points invented by the sagacious Dr. Franklin," Massachusetts was shaken by earthquakes, which Dr. Price perceived to be due to God's wrath at th

The Management of Facial Scars

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OF ALL the deformities seen by the plastic surgeon, facial scars perhaps are most resented by the patient. Society places a social premium on physical attractiveness, and scars would seem so avoidable and are so obviously abnormal that the patient has an acute resentment of them. Neither the family doctor nor the plastic surgeon should minimize the importance of scars, even though they seem mild at first inspection, for often a patient is acutely aware of scars that would seem minimal to the casual observer. For this reason, it is important to evaluate the scars in relation to their effect on the patient.

Scars, of course, may be caused in many ways. In general, they are caused either by infection or by injury. Although automobile designers are becoming increasingly conscious of safety features, automobile injuries still account for the great majority of severe facial scars. The best treatment of unsightly scars will always be their prevention.

The best time to see a facial injury is immediately after it happens, for careful approximation after adequate débridement and cleansing is the key to a well healed wound (Figs. 1 and 2). Fine sutures, removed at the earliest practical date, add to the possibility of a good result. Incisions that cross the lines of cleavage of the skin, or of Langer's natural lines of the facial skin naturally will heal with somewhat more of a scar than will incisions that follow these natural lines or creases. However, even these can be repaired so as to leave a fine line and an insignificant scar (Fig. 2).

Any scar that is unduly wide, noticeably depressed, irregular in contour, elevated or bumpy can be improved and should be improved. Needless to say, scars that include foreign material (traumatic tattoos), or scars that call attention to themselves because of their color, should also be removed and repaired.

Among the infections that result in scars, acne is at the top of the list. Acne scars are generally multiple and depressed; they may be small and discrete, or they may be wide. There may also be deep scarring in the skin, which causes a wavering cutaneous surface and may accompany the more discrete scarring (Figs. 12 and 13). Smallpox and chickenpox scars are similar to the scars of acne except for the fact that the deeper scarring is usually not present (Fig. 15). The pathogenesis of these scars is different, in that the infection is limited to the outer portion of the dermis and to the epidermis in smallpox and chickenpox, barring secondary infection. Acne scars are so often due to secondary infection, to the trauma of squeezing and pustules, and to surgical treatment of the pustules. Needless to say, overzealous roentgen therapy may add to the deep scarring in the skin of acne patients. Prevention of such scars can best be aided by the care of a competent dermatologist. Lupus erythematosus also may cause scarring about the mouth, nose and cheeks, and these scars may be greatly benefited by surgical intervention.

The therapy of scars of the face falls into two classifications: (1) surgical ex-

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 14, 1954.
Submitted for publication Sept. 24, 1954.

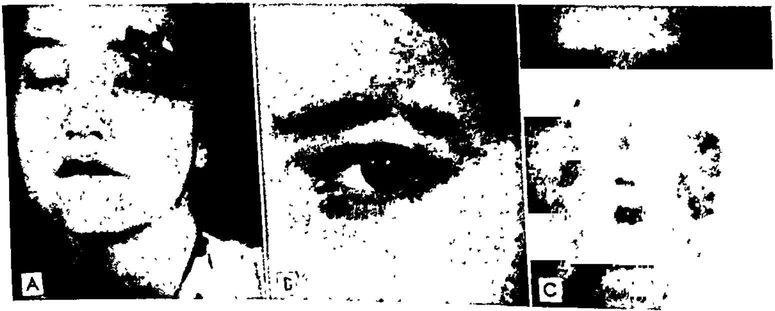

Fig. 1.—*A*, stellate laceration and complete avulsion of part of the eyebrow and eyelid, with complete through-and-through laceration of the lid. *B*, appearance after repair and healing. *C*, appearance after completed repair, with excision of scar that remained in the eyebrow.

cision and repair, and (2) surface smoothing by surgical abrasion. Of course, surgical excision and repair is the method of choice for accidental scars and for the larger scars caused by infection. Even in cases of acne scarring in which surgical abrasion is planned, the wider scars may be excised before the abrasion, or in conjunction with the abrasion, to give a better result (Fig. 3).

Scars resulting from automobile accidents, as from other injuries, should probably not be excised and reclosed for six to ten weeks after the accident. In case of infection, of course, the wait should be much longer. Operation is nearly always carried out with the region under local anesthesia, for block of the sensory nerves of the face is quite satisfactory.

The surgical excision is carefully planned beforehand, so that the surgeon knows at the time of operation exactly what he intends to do. Excision is carried out beyond the edges of the scar tissue, so that soft, pliable, healthy tissue is closed, which prevents the incorporation of any

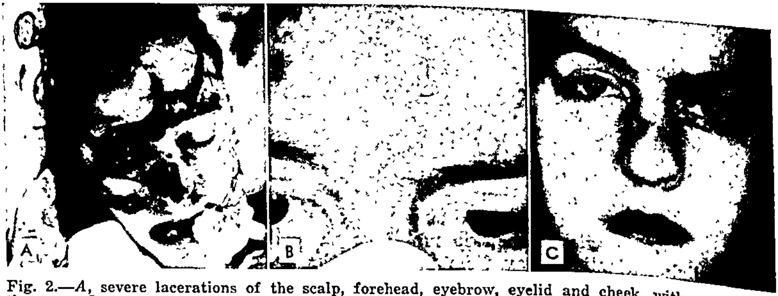

Fig. 2.—*A*, severe lacerations of the scalp, forehead, eyebrow, eyelid and cheek, with avulsion of the nose. *B*, appearance after repair and after excision of one of the forehead scars (the subcuticular nylon suture is in place). *C*, appearance after final repair, including repair of nose by forehead flap. Scars present used to outline flap.

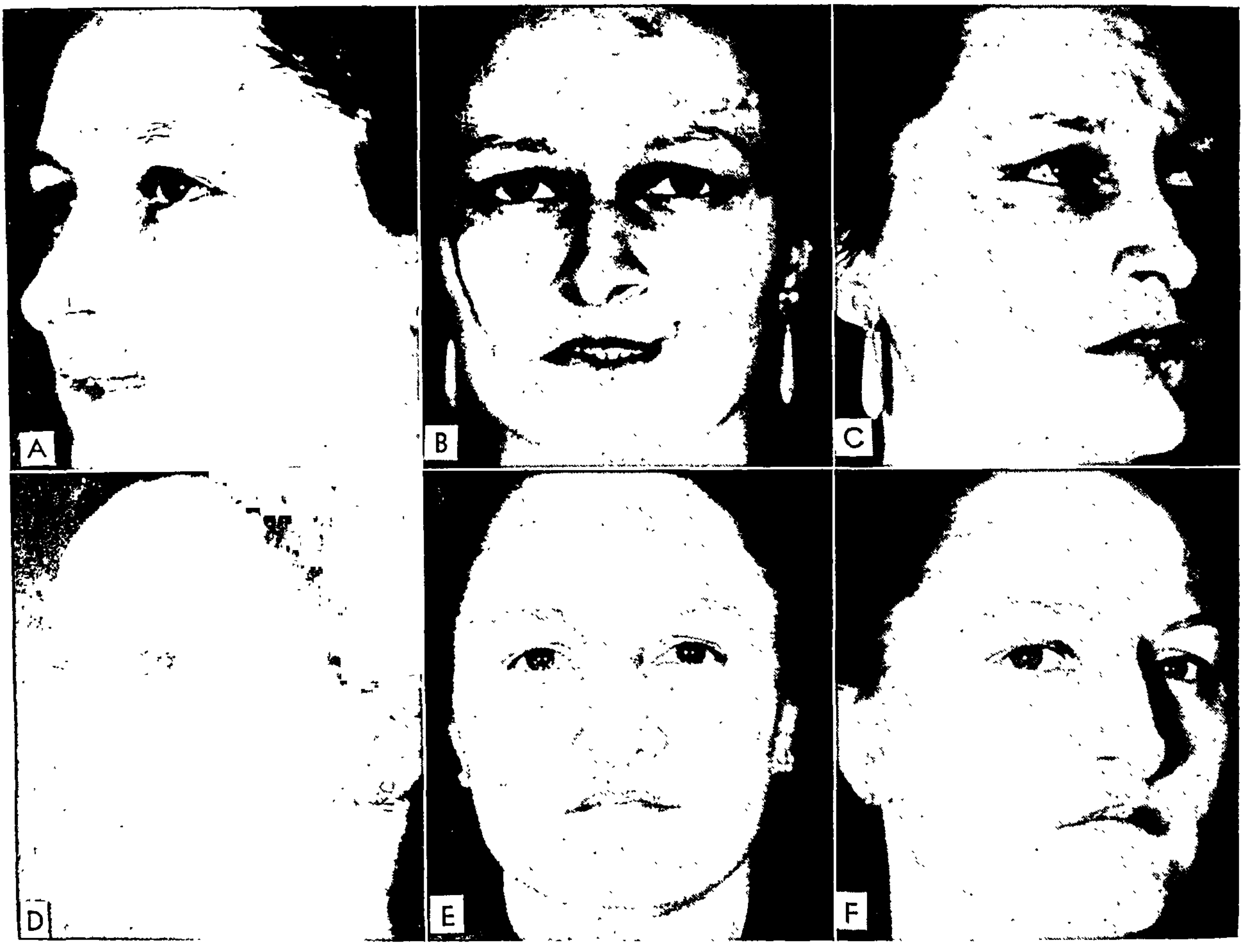

Fig. 3.—*A*, *B* and *C*, multiple scars following automobile accident, revealing defect of lower lip and scars of forehead, cheeks and lips. *D*, *E* and *F*, postoperative views after excision of multiple scars and subsequent surgical abrasion of scars of the forehead and right cheek. Repair of lip was carried out by V excision and repair.

scar tissue in the closure to delay healing and give a less satisfactory result (Fig. 3). The scar is excised in a long ellipse, the ends of the incision being brought together gradually rather than abruptly, and all incisions should be made parallel to the lines of the skin as far as possible. Incisions should be made to curve over flexion creases rather than made as a straight line, which may later contract. The incisions through the skin are made at right angles to the skin surface or slightly slanting away from the scar, so as to leave no edges of dermis or subcutaneous tissue to hold the edges of the repaired wound apart when it is closed. A small wedge of subcutaneous tissue and dermis is excised from beneath each end of the incision, in order to avoid a pucker there after closure. The edges of the skin are undercut in the subcutaneous tissue (not in the dermis), and any protruding dermis or subcutaneous tissue that might hold the skin edges apart is trimmed away. Interrupted Type A white nylon subcutaneous sutures are tied deeply. These sutures are actually partly intracutaneous (in the dermis) and partly subcutaneous, and they pull the skin edges together very snugly (Fig. 4*A*). That leaves the skin sutures to serve the single purpose of pulling the skin edges in exactly the same plane and helping to seal the skin off smoothly (Fig. 4*B*). These skin sutures, therefore, may be removed in twenty-four to forty-eight hours without difficulty. If an intracuticular suture of No. 5-0 single filament nylon is desired, it may be used instead of interrupted No. 6-0 braided black silk skin sutures. I use the two interchangeably (Fig. 2*B*).

An important point in wound closure is to leave a clean, dry wound, but ligatures are used sparingly. Small mosquito hemostats are left on the bleeding points for a few minutes and may be removed with minimal bleeding. Oozing is controlled by pressure over the wound for about two minutes, or by an epinephrine sponge placed in the wound. Larger vessels are ligated with Type A white nylon. A pressure dressing is applied to the wound after it has been repaired, and elastic adhesive tape is used to maintain this pressure. In some cases the dressing is omitted entirely and ice cold witch hazel compresses are applied constantly to the wound throughout the day. Three per cent aureomycin ointment, Bacimycin ointment, or any other suitable antibiotic ointment is applied to the suture line at bedtime. I use this type of postoperative care particularly for incisions about the eyes, mouth and nose, where it is much easier to keep the wound clean if it is left open.

Scars of the nose are repaired similarly, careful attention being given to lining up the alae and the vermilion border in repairing scars of the lips (Fig. 5). Figure-of-eight single filament nylon sutures tied beneath the lip give good approximation and support of the lip without buried sutures. Similar sutures may be used for scars of the alae, but buried sutures are use for scars of the nasal tip or the bridge.

Scars of the lips and eyelids may present a special problem, in that a straight line closure may be undesirable. A broken line closure may be preferred in order to prevent any later contracture of the scar with a resultant deformity of the eyelid margin or lip margin (Figs. 6 and 7). In these circumstances a Hagedorn-Le Mesurier type of technic is used, so as to break the straight line incision and prevent an indenture of the lip border or the eyelid margin. Secondary harelip scars may be excised and transferred to the Hagedorn-Le Mesurier flap type of repair even though they originally were closed in a straight line. The technic results not only in avoidance of a straight line contracture but in building up fullness in the center of the lip and accomplishing symmetry of the lip, which is difficult to obtain by a straight line repair (Fig. 6). In infrequent cases in which the tissue of the lip is too limited to accomplish the

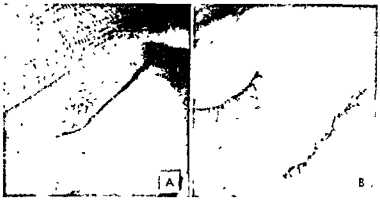

Fig. 4.—*A*, wound closed by buried white twisted nylon sutures after scar excision. Notice close approximation even before skin sutures have been inserted. *B*, appearance after insertion of No. 6-0 silk skin sutures. These are removed in forty-eight hours.

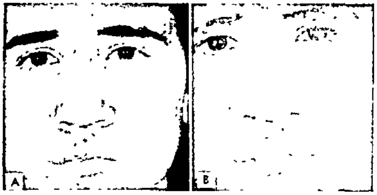

Fig. 5.—*A*, lip scar with very uneven vermilion border. *B*, appearance after z-plasty to equalize the two sides of the lip and even the vermilion border.

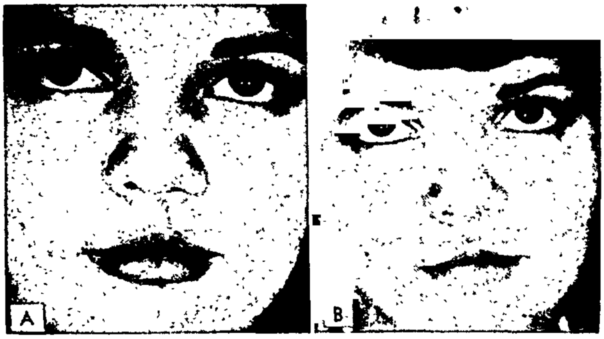

Fig. 6.—*A*, asymmetric lip with straight line lip scar following harelip repair. *B*, view after excision and repair by Hagedorn-Le Mesurier technic, bringing scar to midline at vertebral border.

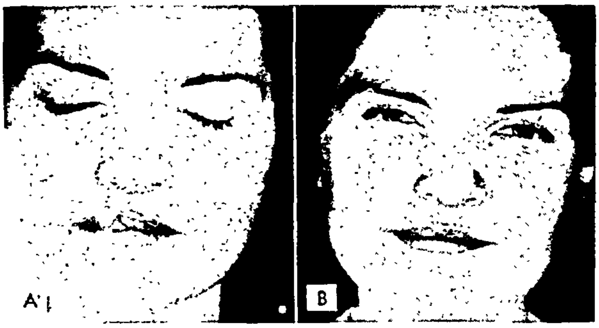

Fig. 7.—*A*, straight line lip scar with notching of lip following harelip repair in childhood. *B*, appearance after repair by flap method, with vermilion border repair carried to the right corner of the mouth as described.

flap repair, bringing the incision to the midline, the incision may be carried to the vermilion border and straight along it laterally, the mucous membrane portion being repaired at the lateral aspect of the upper lip rather than in the midline (Fig. 7). An uneven vermilion border may be evened up by a small Z-plasty (Fig. 5).

Burn scars offer a difficult problem. Those which cannot be corrected by excision and reclosure may be corrected by flaps, Z-plasties or skin grafts (Figs. 8, 9 and 21). Whenever possible, full thickness grafts should be used after excision, and the skin for these should be taken from behind the ears or from the base of the neck for best results. For larger areas split thickness skin grafts may be used; these may be taken from the abdomen or from the medial surface of the thigh. Scar tissue of the lateral aspect of the cheek and along the jaw line may be completely replaced by advancement of the neck skin upward and medially, in stages if necessary (Fig. 10). It is also possible, by Z-plasty, to transfer scar tissue to a lower area of the cheek, where it may subsequently be excised and replaced by advancement of the neck skin.

Hypertrophic scars are usually due to some degree of infection during the healing process, to incisions across flexion creases and across the normal lines of the skin, or to tension in the scar area (Fig. 11). These hypertrophic scars can be excised and reclosed in the manner aforedescribed, tension on the skin surface being relieved by buried white nylon interrupted sutures catching the subcutaneous tissue and a small bit of the dermis. Also, proper postoperative support for seven to ten days with a pressure dressing, and collodion dressings or butterfly strips of adhesive tape after this for three or four weeks will decrease the tendency toward reformation of hypertrophic scars.

True keloids occur, of course, following burns in many persons, and following other injuries in those with a tendency to keloids (Figs. 9, 10 and 11). The current knowledge of keloids is still deficient, and their treatment is certainly far from adequate. Some encouraging facts have emerged, however, concerning the treatment of keloids with hyaluronidase. I have used hyaluronidase for the past two years in the local incision of keloidal scars and have used hyaluronidase by injection into these keloidal scars during the past year. The results obtained by using hyaluronidase in procaine hydrochloride are certainly encouraging (Fig. 11). Hyaluronidase, even when used with epinephrine in procaine, has a much shorter anesthetic effect, and the oozing in the wound is considerably increased. Also, if a considerable amount of epinephrine is used in the procaine, the effect of the epinephrine is felt by the patient rather rapidly and to a marked degree, because of more rapid absorption. For that reason I use 4 to 5 minims of epinephrine per ounce of solution. This usually suffices for the scars, and the effect of the epinephrine is not too marked. A pressure dressing, of course, is used postoperatively, and these scars are supported for a total of about six weeks, as opposed to three or four weeks for the usual scars. The patients are given postoperative roentgen therapy routinely. If there is recurrence, hyaluronidase in 2 per cent procaine hydrochloride is injected twice weekly as long as this tendency to reformation persists. The results so far have been highly encouraging. The use of ACTH and Cortisone has been disappointing, as has the use of roentgen irradiation alone. I do give these patients large doses of ascorbic acid and attempt to have them in good condition when the operation is performed. Antibiotics are used generously to avoid any degree of infection. In injecting the keloids I have used 1 to 2 cc. of 2 per cent procaine hydrochloride containing 150 units of hyaluronidase. Preoperative preparation of a keloid by injection of hyaluronidase (8 to 12 infiltrations twice weekly or weekly) has been recommended by Dr. Cornbleet. After excision, he recommends roentgen therapy in the amount of eight to twelve after-treatments of 90 roentgen units daily. The theory of the action of the hyaluronidase is that it causes the breakdown and subsequent removal of the ground substance of the excessive fibrous tissue and at least temporarily stimulates the secretory cycle of the fibroblasts. The injection of hyaluronidase certainly softens and flattens recent keloids and decreases the pain and itching. Old keloids respond more slowly and to a less degree and nearly always must be excised after preoperative preparation.

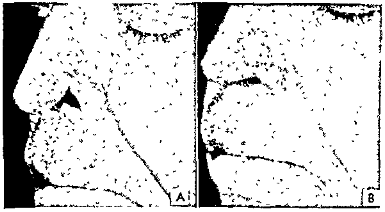

Fig. 8.—*A*, contracted scar of left side of nose and left ala. *B*, appearance after repair by bringing left ala down and applying full thickness skin graft to replace scar tissue.

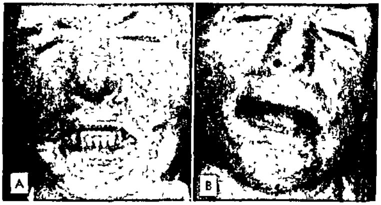

Fig. 9.—*A*, severe burn scars of the face with very uneven rough keloid scars over whole face, and contractures of both lips and left upper eyelid. *B*, appearance after immediate repair by full thickness graft to the lips, light surgical abrasion to the cheeks and repair of left eyebrow by scalp graft. Abrasion of the lip grafts is to be carried out to help blend in the grafts and decrease the color difference.

Surgical abrasion of the skin has been effective in improving pitted scars due to infection (acne, smallpox, chickenpox) and uneven scars due to trauma and infection. Primarily of interest is the degree of improvement that can be accomplished by this procedure. Experience has shown that the depth of the pitted scars is not as important as their width. The deep scars can be smoothed out remarkably, though they require deeper abrasion. The extremely wide d[illegible] he

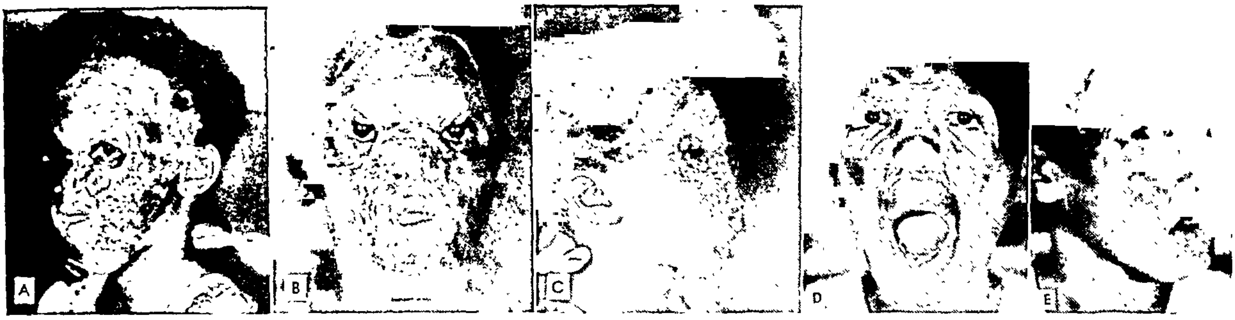

Fig. 10.—*A*, *B* and *C*, severe burns of the face. The mouth is open to the fullest extent possible, and the nostrils are not open. *D*, and *E*, appearance after repair by advancement of neck skin upward and medially in multiple stages and full thickness grafts across the nose and upper lip. Also full thickness graft to lower eyelids and split thickness graft to the forehead.

other hand, must frequently be left as a wavering surface, though less deep and less sharply demarcated than before (Fig. 12). In general, the more severe the scars, the more the degree of change accomplished by operation; the less severe the scars, the more nearly perfect the skin after operation (Figs. 12, 13 and 14). The type of skin also determines the degree of smoothing which can be accomplished. The very fair complexion and the very fine-textured skin respond less favorably than do the coarser-textured skin and the ruddy complexion; the oily skin responds more favorably than does the dry skin.

Age seems to have no effect on the outcome, and my results on patients between 40 and 60 compare favorably with those on adolescents and patients in the twenties. Moderate activity of acne has proved to be no contraindication, and the patients have had less activity after such treatments.

Pitted scars due to smallpox and chickenpox respond dramatically (Fig. 15), and abrasion is the method of choice as well as for treating numerous small traumatic scars in a small area, such as result from flying glass. Traumatic scars in general are improved considerably by surgical abrasion if they are uneven or are not properly blended into the normal skin contour (Fig. 3). The abrasion may be carried out at the time of surgical excision in patients requiring excision, or at a subsequent date. Patients treated by roentgen

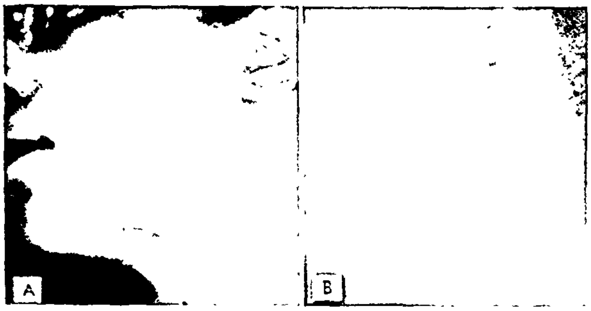

Fig. 11.—*A*, keloid scar of the neck. (This may more correctly be termed a hypertrophic scar.) *B*, appearance after surgical excision with local anesthesia and use of hyaluronidase in procaine. (Patient has had no recurrence one year after the operation.)

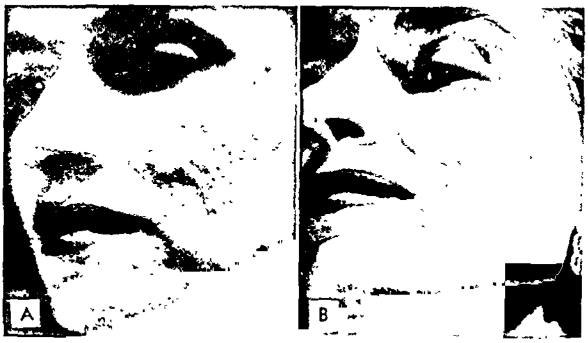

Fig. 12.—*A*, acne scars of the cheek with considerable deep scarring. *B*, postoperative view reveals some wavering of skin surface still present but considerable improvement. Surgical abrasion was carried out in two stages, with local anesthesia.

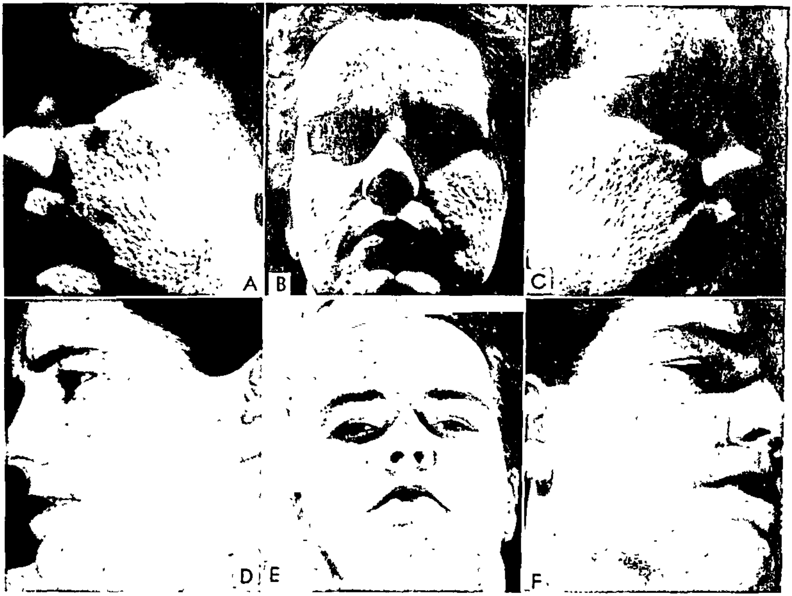

Fig. 13.—*A*, *B* and *C*, multiple acne scars of the whole facial skin. *D*, *E* and *F*, postoperative views revealing considerable improvement after surgical abrasion in three stages.

ray heal apparently as readily as those who have not had irradiation, and the results are as good. In some cases there has been obvious overuse of roentgen therapy and fine crinkly wrinkles have appeared in the skin. Abrasion has improved these considerably (Fig. 16). Extensively overtreated patients would be expected to have atrophy of the sebaceous and sweat glands and hair follicles, and thinning of the epidermis with flattening of the rete pegs. Since the epidermis regenerates from these structures after abrasion, one should carry out surgical abrasion cautiously and not attempt to abrade as deeply. In such cases the skin may show more effects from the overtreatment than from the acne, revealing splotchy pigmentation, telangiectasis, crinkly wrinkling and areas of shiny atrophy. Abrasion carried out cautiously with the rotating disc or brush or with fine sandpaper (No. 1), and carried out less deeply, improves the texture and color of the skin (Fig. 18). Two areas clinically thought to be early malignant growths have been included among the cases of abrasion of roentgen dermatitis, with no recurrence in three years.

Scars following lupus erythematosus are usually wide and would necessitate full thickness skin grafts if any operation other than abrasion were carried out. However, if one abrades and levels off the edges of the scars, the difference is not nearly so noticeable, and no shadow is cast

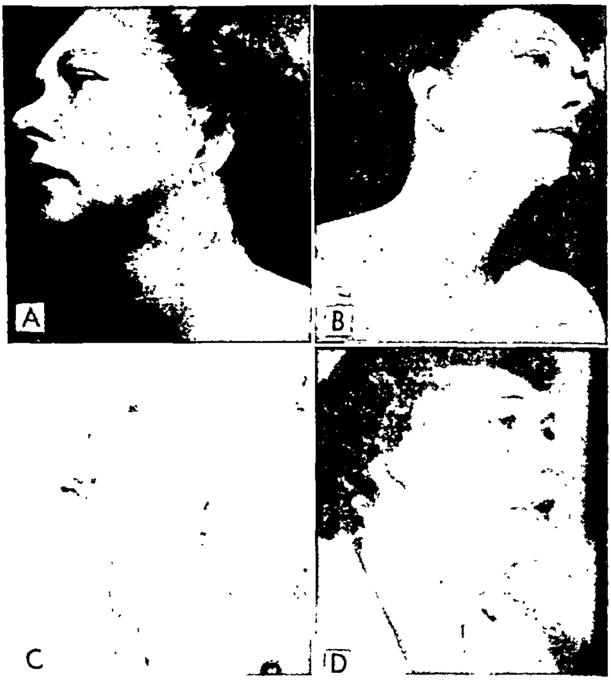

Fig. 14.—*A* and *B*, multiple scars due to acne. These have remained unpigmented when patient is exposed to the sun. *C* and *D*, appearance one year after surgical abrasion, showing improvement still present and blending out of scars.

at the scar margin (Fig. 19). Pigmented scars or scars containing foreign material (traumatic tattoos) are treated in a similar fashion. The abrasion is carried out as deeply as necessary over the scarred areas, and most of the foreign material is thereby removed (Fig. 20). As the skin heals it covers any remaining foreign material and makes it much fainter and sometimes invisible. Of course, wide scars containing foreign material should be excised prior to this procedure.

The technic which I use for surgical abrasion has been standardized as follows:

Preoperative Preparation.—The patient is instructed to wash his face, ears and neck thoroughly with Phisohex and water on the night before the operation and the morning of the operation before going to the operating room. A sedative is given the preceding night and is repeated one and one-half hours before the operation, and again one half hour preceding surgery. Demerol, 100 mg. and atropine 1/150 gr., are given about thirty minutes before the operation. In the operating room the facial skin is cleansed with 70 per cent alcohol or with Phisohex followed by alcohol.

Operative Technique.—Local infiltration anesthesia with 1 per cent procaine hydrochloride containing about 5 minims of 1:1,000 epinephrine hydrochloride per ounce is used. Hyaluronidase may be used in the procaine for better diffusion, but the anesthetic does not last quite so long and oozing is more notable. Blocking of the individual nerves results in a lumpy irregular bed for the abrasion, and an even subcutaneous infiltration provides a firm smooth area. By using a needle 2½ to 3 inches (6.2 to 7.6 cm.) long, of 22 to 25 gauge, the infiltration can be carried out through one skin puncture without the pain involved in multiple punctures. The initial site of puncture is usually located about 2 cm. lateral and 1 cm. inferior

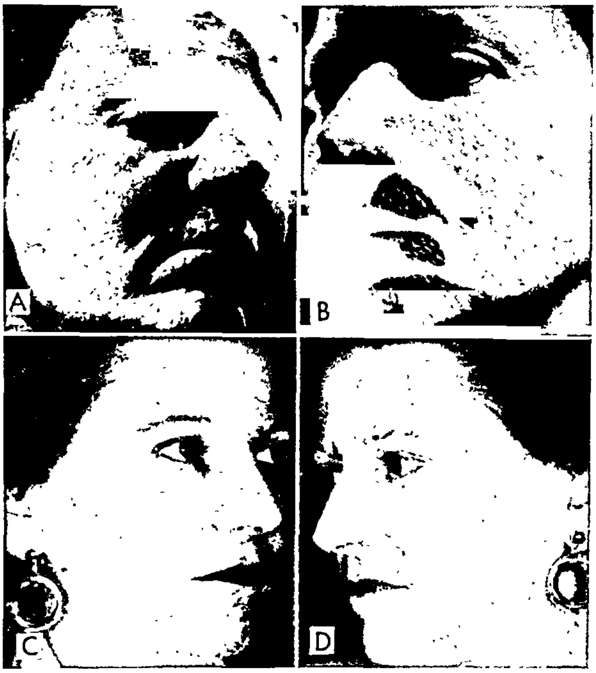

Fig. 15.—*A* and *B*, smallpox scars of forehead, nose, cheeks and lips. *C* and *D*, appearance after surgical abrasion in two stages.

to the external canthus of the eye. The needle is then carried medially toward the base of the nose through the base of the lower eyelid; the needle is inserted, the solution is injected slowly as it is withdrawn. The needle is withdrawn nearly out of the wound and is reinserted in a slightly lower and backward direction, until an arc extending back to the tragus of the ear has been transcribed, carrying the procaine solution into the whole cheek area and the lateral aspect of the chin. Through the same point of injection the temporal area of the skin may also be anesthetized. The forehead is anesthetized by infiltrating an arc across the supraorbital area into the temples.

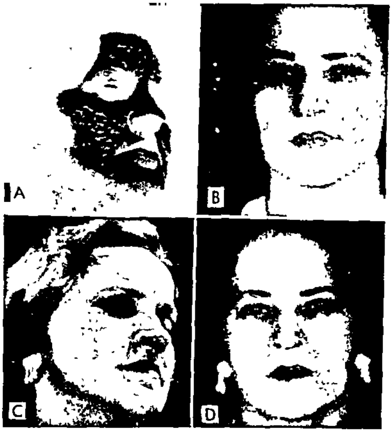

Fig. 17.—*A* and *B*, multiple scars of the forehead, cheek and nose following acid burns caused by splattering acid. *C* and *D*, postoperative views. Note the improvement brought about by surgical abrasion in three stages performed as an office procedure, with local anesthesia.

Abrasion may be carried out either by mechanical sanding or by hand sanding. If the sandpaper method is used, abrasion is carried out by stroking motions, sterile (autoclaved) sandpaper, Grade 1 to Grade 2½, being used. This may be wrapped, rough side outward, about a roll of sterile gauze or may be used around the index finger. The abrasive motion is always carried out parallel to Langer's cutaneous lines, so that no deep scratch will leave a permanent scar. A back-and-forth motion is used by some, but practically all of my abrasive motion is directed downward or laterally.

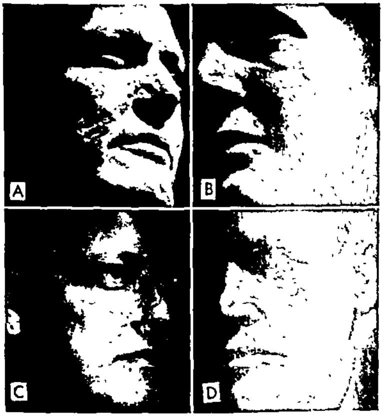

Fig. 16.—*A* and *B*, multiple acne scars of the cheeks and chin with fine crinkly wrinkles following overtreatment by roentgen rays. *C* and *D*, postoperative views. Note smoothing of scars and considerable improvement of roentgen effects. A final abrasion has since been carried out.

For me, mechanical abrasion has almost completely replaced hand abrasion with sterile sandpaper. I use a dental drill and a flexible shaft drill interchangeably. An ethyl chloride spray in conjunction with a blower may be used for anesthesia and is best used after preliminary chilling with cold packs. I frequently use this method for smaller areas; for larger areas I still prefer local anesthesia as aforedescribed. The procaine not only serves the purpose of anesthesia but fills out the depressed areas of the face to make a firmer base for the abrasion. The ethyl chloride spray freezes the skin for a few moments, so that the abrasion may be carried out hurriedly while the tissue is hardened and under anesthesia. Procaine has the advantage of allowing the surgeon to work on one whole cheek and to take his time in working over any particular area. Ethyl chloride has the advantage of simplicity but the disadvantage of hurrying the surgeon, and it does not permit the refreezing of an area for a second time in case the anesthesia does not last long enough. Postoperative pain, with delayed healing and prolonged redness, may result.

Mechanical abrasion may be carried out by using abrasive bands around a rubber-shod holder and fine steel brushes of various widths, as recommended by Kurtin. The steel brushes are to be preferred if the ethyl chloride spray technic is employed, but they must be used very carefully to avoid digging and cutting the skin. The abrasive bands have the disadvantage of having to be changed frequently, but they are satisfactory and safe.

The abrasion is carried across the cheeks, and it is most safely performed in such a way that the abrasive band or brush moves in a direction parallel to the lines of the skin. I usually hold the drill so that the rotation is in a direct parallel to the lines of the skin and then move the

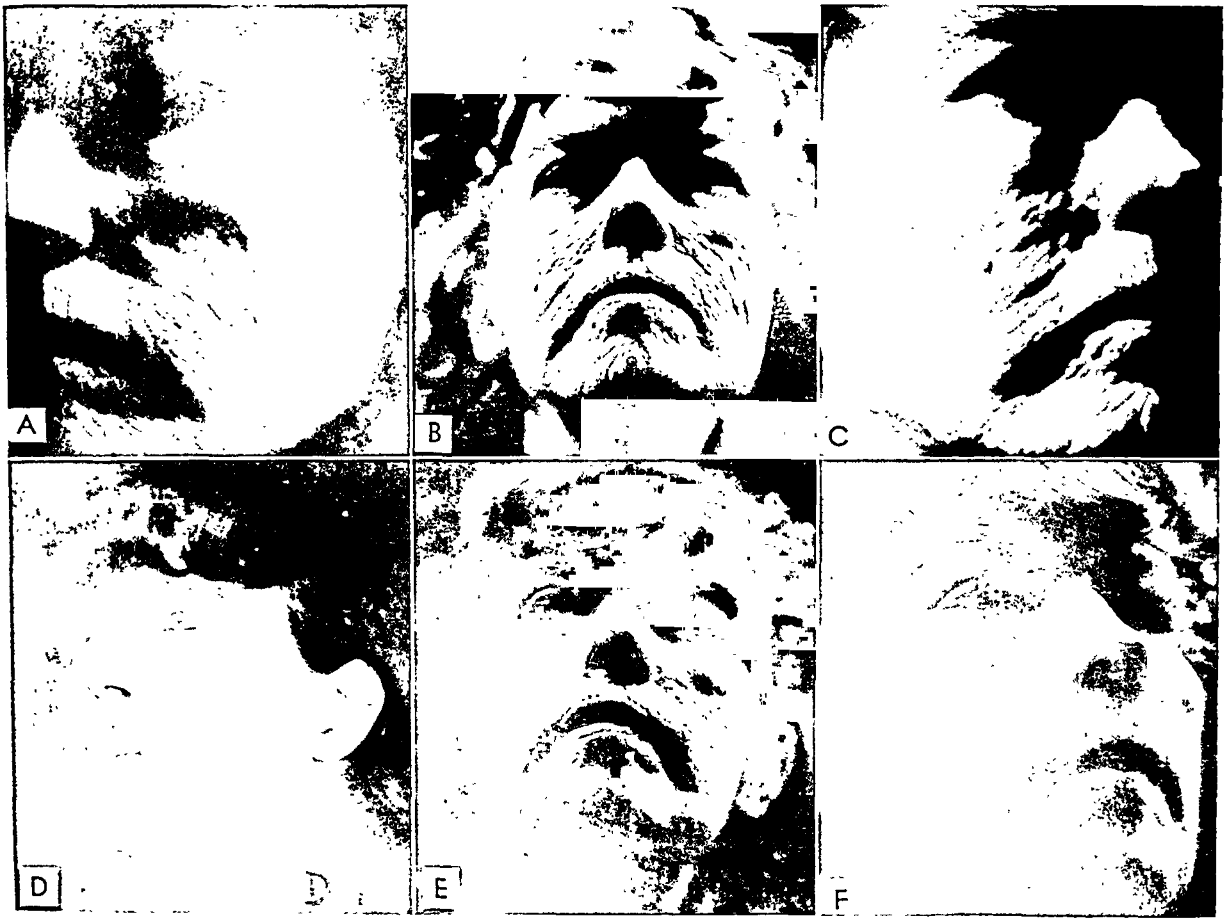

Fig. 18.—*A*, *B* and *C*, severe roentgen atrophy of the facial skin caused by irradiation for acne in early youth. *D*, *E* and *F*, postoperative views. Note improvement in discrete scars, smoothing of skin with improvement in the wrinkles, and improved texture and color of skin.

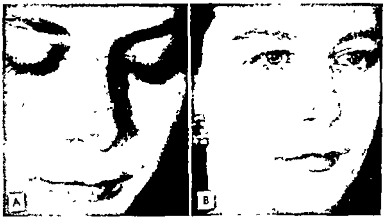

Fig. 19.—*A*, scars of nose and cheek, resulting from lupus erythematosus. *B*, appearance after surgical abrasion in one operation with local anesthesia.

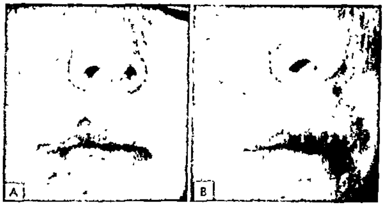

Fig. 20.—*A*, traumatic tattoo following fall from bicycle in gravel. *B*, appearance after surgical abrasion (with local anesthesia) to remove foreign material from skin.

rotating abrasive transversely to these lines, so that the abrasion will not cut deeply at any one area. The wire brushes may be used in a similar fashion, the brush being moved across the cheeks so that it cannot cut deeply into the skin. The abrasion is continued until there is an even, red, oozing surface. The depth of the scar or scars under treatment is a gauge of the depth to which the abrasion should be carried. When the ethyl chloride freezing technic is used, the anesthesia lasts only a few moments and is usually beginning to wear off by the time the area begins to ooze and turn pink. It is best not to refreeze an area for further abrasion.

The area is then thoroughly cleansed with Phisohex and water as was done immediately before the operation. The Phisohex is thoroughly flushed away and a damp saline sponge is applied to the area while another area is abraded. An epinephrine sponge may be used if oozing is excessive, but this is seldom necessary. At the close of the procedure a fine-meshed cotton gauze saturated with Furacin ointment, aureomycin ointment or bacimycin ointment is applied to the raw surfaces. Over this is applied a fluffy gauze dressing, and the bandage is anchored by adhesive strips to the bridge of the nose and to the temples. If the forehead and temples are abraded, a head bandage is required, and adhesive strips from this are carried down

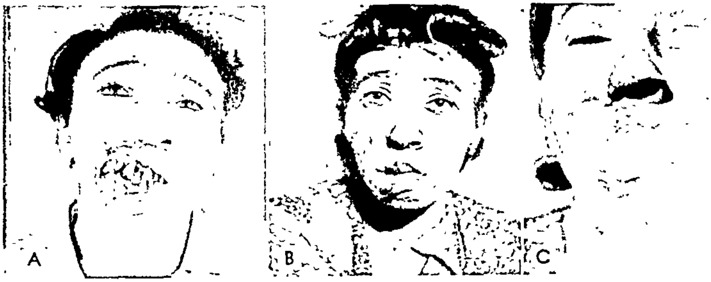

Fig. 21.—*A*, defect of mouth with severe scarring caused by a burn [illegible] immediate repair with flap from upper part of arm. *C*, photograph [illegible] which she can now open the mouth with the [illegible]

on the neck and chin to anchor the bandage on the cheeks.

The external fluffy gauze bandage may be changed as desired but is usually not changed for three or four days. On the sixth or seventh day the external bandage is removed, a bland lanolin cream is applied to the fine-meshed gauze, and the external gauze dressing is reapplied. (Sterile petrolatum or some other lubricant may be used.) Twenty-four or forty-eight hours after application of the lanolin cream the whole bandage is removed gently, the newly epithelialized cheek skin being left intact. It is advisable that only gentle cleansing of the cheeks be carried out for two or three days and that a bland anolin cream be applied to them morning d night. Make-up may be used during e day if desired, but it should be washed off gently at night and the bland cream reapplied. Excessive sunlight on the facial skin must be avoided for a minimum of two weeks.

The next stage of surgical abrasion may be carried out eight weeks after the first stage. The third stage, if needed, is usually delayed for eight to twelve weeks after the second stage. When a fourth stage is indicated, an interval of four to six months is usually desirable.

Milia (whiteheads) may occur in young patients or in those who have very active sebaceous glands. These usually go away without any treatment over a matter of weeks, but they may be evacuated individually with a small needle. The next stage of abrasion eradicates these milia, though a lesser number may occur at each succeeding stage. They eventually disappear of themselves in most cases, but they may be evacuated between stages if desirable.

With regard to my criticism of the use of sterile sandpaper or abrasive bands for abrasion of the facial skin, I have yet to encounter my first case of granuloma or irritation caused by imbedded sand. This material is easily removed from the skin after the abrasion has been finished by a thorough cleansing with Phisohex and water, or by flushing the face with saline solution. As to the criticism of general anesthesia for this procedure, I must add that I perform all my operations with the field under local anesthesia as a matter of personal choice. I consider it safer and better for the patient, and I do not run the risk of postoperative nausea and vomiting, with soiling of the bandages.

SUMMARY

The advantages and disadvantages of surgical abrasion for the patients with facial scars are described as follows:

Disadvantages.—1. More than one operation is usually necessary. 2. A wait of eight weeks or more between operations is advisable. 3. A bandage is necessary for seven to eight days after each operation. 4. Redness of the treated areas is present temporarily after removal of the bandage.

Advantages.—1. The operation is performed with the region under local anesthesia. 2. The patient may be an inpatient or an outpatient, as desired. 3. After-pain is minimal or absent. 4. The results of treatment are good.

The only disadvantage for the surgeon, the long tedious procedure required, has been abolished by the use of mechanical abrasion, with no loss of effectiveness.

Facial scars, from whatever cause, can be greatly improved by plastic surgical intervention. Either by surgical excision and repair of these scars or by surgical abrasion of the scars and surrounding skin, they may be made much less noticeable, which improves the personality of the patient and his effectiveness in social life and in business.

SUMARIO

As vantagens e desvantagens da abrasão cirúrgica em casos de cicatrizes faciais são as seguintes:

Desvantagens: 1. Em geral é necessária mais de uma operação. 2. È aconselhável um intervalo de 8 semanas ou mais entre as operações. 3. È necessária uma bandagem de 7 a 8 dias após cada operação. 4. Temporàriamente mantem-se uma vermelhidão das areas tratadas, após a retirada da bandagem.

Vantagens: 1. A operação é feita sob anestesia local. 2. O paciente pode estar internado ou tratado em Ambulatório. 3. A dôr pós-operatória é nula ou inexistente. 4. Os resultados do tratamento são bons.

A única desvantagem para o cirurgião, o longo e tedioso processo necessário, foi abolido pelo uso da abrasão mecânica, sem perda de sua eficácia.

As cicatrizes faciais, quais sejam suas causas, podem ser grandemente corrigidas pelas intervenções plásticas. Quer pela exerese cirúrgica e reconstrução ou por abrasão cirúrgica da cicatriz e pele vizinha, elas podem resultar muito menos perceptíveis, fato que melhora a personalidade do paciente e sua capacidade para fins sociais e econômicos.

RIASSUNTO

Vengono descritti—come segue—i vantaggi e gli svantaggi dell'asportazione chirurgica delle cicatrici della faccia.

Svantaggi: 1. E' necessario più di un atto operatorio. 2. Fra un intervento e l'altro devono passare 8 settimane o più. 3. Dopo ogni intervento è necessaria una fasciatura per sette o otto giorni. 4. Dopo rimozione della fasciatura l'area operata si presenta temporaneamente arrossata.

Vantaggi: 1. L'operazione si fa sotto anestesia locale. 2. Il paziente può essere —a suo desiderio—trattenuto in ospedale o no. 3. Minimo o assente è il dolore postoperatorio. 4. I risultati sono buoni.

L'unico svantaggio per i chirurghi, rappresentato dal lungo e noioso procedimento, è stato abolito con l'uso di abrasioni meccaniche, senza che il metodo ne perda in efficacia.

Le cicatrici facciali, qualunque ne sia stata la causa, si possono notevolmente migliorare con la chirurgia plastica. Sia con l'escissione, sia con l'abrasione chirurgica, esse divengono molto meno evidenti contribuendo così a migliorare lo stato d'animo del paziente e la sua efficienza nella vita sociale e nel lavoro.

RESUMEN

Se describen las ventajas y desventajas de la abrasión quirúrgica en pacientes con cicatrices faciales:

Desventajas: 1. Generalmente se requiere más de una operación. 2. Se aconseja esperar ocho semanas o más entre cada operación. 3. Durante los siete u ocho *días después de cada operación es necesario* el uso del vendaje. 4. El rubor de las áreas tratadas se presenta temporalmente después de quitarse el vendaje.

Ventajas: 1. La operación se realiza con anestesia local. 2. El paciente puede ser conforme se desee, hospitalizado o externo. 3. El dolor postoperatorio es mínimo o nulo. 4. Los resultados del tratamiento son buenos.

La única desventaja para el cirujano es lo largo y lo tedioso del procedimiento requerido, la cual ha sido abolida por el uso de lija mecánica sin menor eficiencia.

Las cicatrices faciales de cualquier causa pueden ser mejoradas grandemente por intervención quirúrgica plástica. La extirpación quirúrgica y la reparación de estas cicatrices o la abrasión quirúrgica de las mismas y de la piel circundante puede hacerias menos notables, lo cual mejora la personalidad del paciente y su situación en la vida social y en sus negocios.

ZUSAMMENFASSUNG

Die Vorzüge und Nachteile der chirurgischen Abschabung von Gesichtsnarben werden folgendermassen beschrieben:

Nachteile: 1. In der Regel ist mehr als ein Eingriff notwendig. 2. Zwischen den Operationen ist eine Wartezeit von 8 Wochen oder mehr ratsam. 3. Sieben bis acht Tage nach der Operation muss ein Verband getragen werden. 4. Nach Entfernung des Verbandes besteht eine zeitweilige Rötung der behandelten Gebiete.

Vorzüge: 1. Die Operation wird unter Lokalanästhesie der zu behandelnden Gegend ausgeführt. 2. Der Patient kann nach Wunsch sich im Krankenhaus aufhalten oder ambulant sein. 3. Schmerzen nach der Operation sind minimal oder garnicht vorhanden. 4. Die Erfolge der Behandlung sind gut.

Der einzige Nachteil, der den Chirurgen betraf, nämlich die Länge und Mühseligkeit des Verfahrens, ist durch die Anwendung mechanischer Abschabung ausgeschaltet worden, ohne dass die Wirksamkeit darunter gelitten hätte.

Gesichtsnarben können, was immer ihre Ursache sein mag, durch plastische chirurgische Behandlung in hohem Masse verbessert werden. Durch chirurgische Exzision und plastische Korrektur solcher Narben oder durch chirurgische Abschabung der Narben und der angrenzenden Haut können die Schäden erheblich weniger bemerkbar werden, was auf die Persönlichkeit des Kranken und auf seinen Erfolg im geschäftlichen und gesellschaftlichen Leben einen günstigen Einfluss hat.

RÉSUMÉ

Les avantages et désavantages de l'abrasion chirurgicale des cicatrices faciales sont décrits comme suit:

Désavantages: 1. Une seule opération est rarement suffisante. 2. Un intervalle de 8 semaines ou plus entre les opérations est à recommander. 3. Un pansement est nécessaire durant 7 ou 8 jours après chaque opération. 4. Il subsiste une rougeur temporaire après la suppression du pansement.

Avantages: 1. L'opération est faite sous anesthésie locale. 2. Le malade peut être traité à la clinique ou ambulatoirement. 3. Douleurs post-opératoires minimes ou absentes. 4. Bons résultats du traitement.

Les cicatrices faciales, quelle que soit leur cause, peuvent être grandement améliorées par une opération plastique. Elles peuvent être très atténuées—soit par l'excision et la réparation plastique, soit par l'abrasion chirurgicale de la cicatrice et de la peau environnante—ce qui améliore le moral du malade et son rendement social.

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A Technic of Extension of Groin Incisions Into the Pelvis, as Used in Regional Vascular Surgery

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OCCASIONALLY vascular lesions in the femoral vessels necessitate further exploration of the iliac vessels. In approaching the problem, the surgeon has the choice of two procedures; one is entry into the pelvis through a separate low abdominal incision, the other an extension of the primary incision by cutting across the aponeurosis of the external oblique muscle, the inguinal ligament and its attached muscles. Both of these methods have their evident inconveniences. I have circumvented these by resorting to the principle of the "abdominal hinge" or the "door and knob" method of exposure of the iliac retroperitoneal space as described previously.[1] This approach to the iliac fossa was originally used for the *en bloc* lymphatic excision of the inguinal and iliac regions. The satisfactory exposure of the great vessels during this procedure encouraged me to use it in operations involving the femoral and iliac blood vessels. In this communication a description will be given of the modified procedure for exposure of these vessels.

Anesthesia.—The choice of anesthesia is guided by the condition of the patient. Local block and infiltration anesthesia is used to advantage for elderly patients with myocardial and/or pulmonary disease. Osteotomy of the anterior superior iliac spine can be done after infiltration of the periosteum with 1 per cent procaine hydrochloride.

Position.—The patient is placed in the supine position. The hip is slightly flexed and abducted. The table can be tilted to the opposite side at any time during the procedure, to allow the intestines to fall away from the side operated on.

Technic.—If an oblique or a vertical

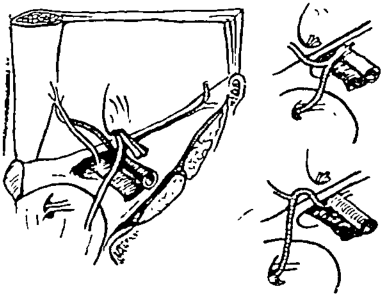

Fig. 1.—Familiar diagrams of the external iliac vessels and branches as viewed from inside the abdomen. On the right, some common anomalies of the obturator vessels are shown. The anomaly in lower right diagram should be kept in mind when cutting the inguinal ligament off the lacunar (Gimbernat's) ligament. (Modified from Fog. 539, p. 631 of Grey's Anatomy, 25th Ed., Lea and Febiger 1918, Philadelphia).

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Submitted for publication Sept. 15, 1954.

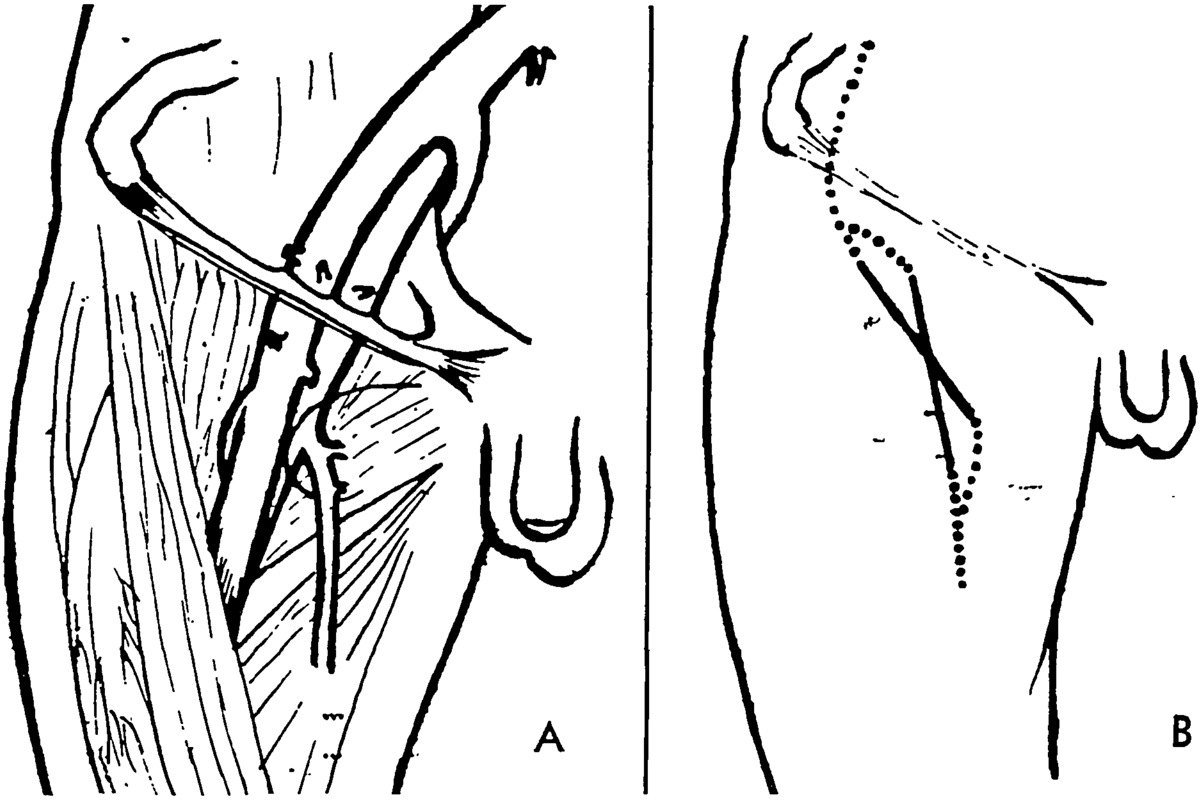

Fig. 2.—*A*, the great vessels as they pass under the inguinal ligament. This ligament is part of the anterior abdominal wall. The fascia lata of the thigh and the iliac and transversalis fasciae are attached to the undersurface of its reflected part. *B*, dark continuous lines in the groin, indicating incisions commonly used for exposure of the femoral vessels. Dotted lines indicate their extensions.

incision was made originally in the groin, it is extended cephalad (Fig. 3) ; a downward extension of the incision is not a problem. Next the anterior superior spine is exposed. It is drilled at a suitable site and osteotomized halfway across, through the drill tract (Fig. 4). The iliac retroperitoneal space is reached easily by cutting the muscles of the anterior abdominal wall about 2 cm. from the iliac crest in the direction of the abdominal cutaneous incision. The surgeon's finger now easily finds and dissects the retroperitoneal loose areolar plane.

The osteotomized anterior superior iliac spine is gently lifted and the inguinal ligament dissected from the iliac fascia and the fascia lata by blunt and sharp dissection (Fig. 5). The deep iliac circum-

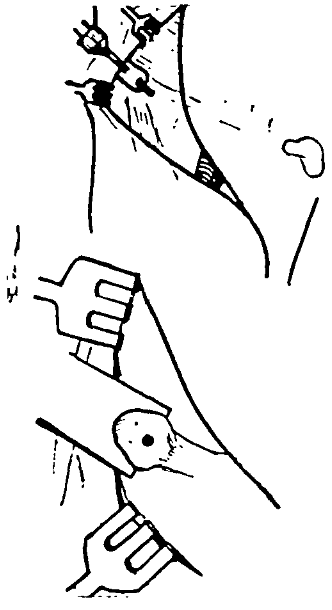

Fig. 3.—Drilling and osteotomy of the anterior superior iliac spine.

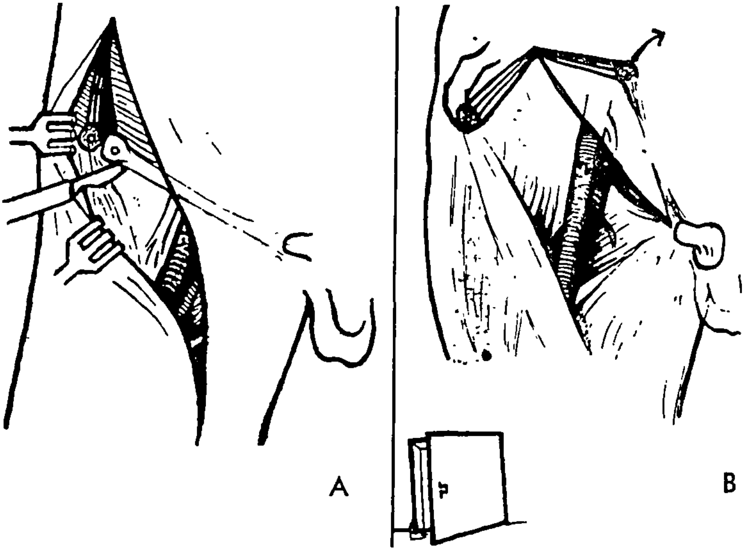

Fig. 4.—*A*, cutting of the muscles of the abdominal wall. The iliac retroperitoneum is entered and the inguinal ligament freed of its fascial attachments. *B*, freeing of the inguinal from its fascial attachments. The deep epigastric and deep iliac circumflex vessels are clamped, cut and ligated. The pelvic retroperitoneal space is dissected. The peritoneum, the transversalis fascia and the abdominal wall, together with the inguinal ligament in its entirety, can now be retracted upward and medially to expose the common iliac vessels. The ureter in this dissection is shelled out with the transversalis fascia. Note the similarity of "door and knob" to this exposure.

flex and the deep epigastric vessels are clamped and ligated as they come into view. Anomalous branches of these vessels, if present, are dealt with similarly. The danger of injuring the large vessels is remote if the separation of Poupart's ligament from the underlying fasciae is done under vision.

If an approach to the common iliac vessels is contemplated, the inguinal ligament is freed from the lacunar ligament by cutting medialwards to the pubic tubercle. The abdominal incision at the iliac crest is extended cephalad 2 or 3 cm. or more, for the same reason. The peritoneum, the retroperitoneal fat and the transversalis fascia, together with the spermatic cord and its structures, are easily shelled and retracted medially. The ureter, deeper in the pelvis, is treated similarly. The surgeon now has an ample exposure for the contemplated operation on the exposed vessels (Fig. 6).

The surgical repair is carried out by suturing the abdominal wound in layers. The anterior superior iliac spine is reattached to its bed by a steel alloy wire looped through the prepared drill holes. A few interrupted sutures fix Poupart's ligament to the fascia lata. A drain may be left in the pelvic retroperitoneal space for a day or two. I close the skin with medium-sized nylon and use cotton to the deeper tissues.

The postoperative care is suited to the needs of the patient and the demands of the vascular surgical procedure. The repaired wound is firm enough to permit early ambulation. Removal of the sutures may be delayed a few days longer than usual, owing to the poor healing of wounds occasionally encountered in the groin.

COMMENT

In the proper evaluation of surgical incisions, the following criteria serve as guides[1]: (1) the primary requisite, ease of approach to the underlying diseased structures; (2) extensibility of an incision without unnecessary trauma and sacrifice of important structures; (3) security and reliability of closure, and (4) good cosmetic results.

It is beyond the scope of this paper to discuss the relative merits of the aforementioned points. The operative procedure herein described fulfills the first three requirements satisfactorily. Although an extraperitoneal approach is used, the vascular trunk from the common iliac to the femoral vessels at the apex of Scarpa's triangle is in the center of the wound without undue retraction. Avoidance of unnecessary surgical trauma to the underlying tissues and minimal physiologic disturbance of the neighboring structures are other desirable features of this procedure. The inguinal ligament and the two muscles arising from its reflected portion are spared in this approach to the iliac retroperitoneal space; moreover, the inguinal canal and the structures of the internal abdominal ring are not traumatized, which diminishes the incidence of postoperative incisional herniation. This principle of extension of the wound with minimal trauma to structures has been worked out by Henry for the limbs.[2] Finally, the ease of the immediate repair and its reliable end results are natural consequences of the aforementioned points.

One undesirable feature of the incision is its relatively poor cosmetic result. The incision bisects the Langer lines of tension at the groin, and this in time causes diastasis of the scar. However, since the scar is on an unexposed part of the body, it may not be a serious drawback.

SUMMARY AND CONCLUSIONS

Incisions in the femoral triangle commonly used for operation on the femoral vessels could be extended by the "door and knob" technic into the iliac fossa, thus exposing satisfactorily the vascular trunk from the bifurcation of the aorta to the apex of the femoral triangle. Owing to minimal sacrifice of tissue and function, the surgical repair is easy and reliable.

ZUSAMMENFASSUNG

Der bei Operationen an den Oberschenkelgefässen übliche Einschnitt in das Oberschenkeldreieck lässt sich mit Hilfe der sogenannten "Tür und Griff"—Technik in die Darmbeingrube hinein ausdehnen. Auf diese Weise kann man den ganzen Gefäbstamm von der Bifurkation der Aorta bis zur Spitze des Oberschenkeldreiecks gut exponieren. Da es nur zu einem minimalen Verlust an Gewebe und Funktion kommt, ist die chirurgische Wiederherstellung einfach und zuverlässig.

RÉSUMÉ

Les incisions dans le triangle de Scarpa, pratiquées couramment dans l'opération des vaisseaux fémoraux, pourraient être complétées par la technique du "door and knob," exposant ainsi de façon satisfaisante les éléments vasculaires du triangle de

Scarpa. Etant donné la plaie minime que cette technique provoque, la réparation chirurgicale des tissus est facile et sans danger.

SUMARIO

As incisões no triângulo femoral, comumente usadas em operações sôbre os vasos femorais, poderiam ser ampliadas, para atingir a fossa ilíaca, expondo assim satisfatoriamente o tronco vascular desde a bifurcaão da aorta ao ápice do triângulo femoral. Devido ao sacrifício mínimo de tecidos e de função, o tratamento cirúrgico torna-se fácil e seguro.

RIASSUNTO

La usuale incisione nel triangolo di Scarpa per la scopertura dei vasi femorali può essere allargata fino alla fossa iliaca, con un particolare metodo, in modo da poter esporre i vasi dalla biforcazione aortica fino all'apice del triangolo. L'incisione è economica e guarisce bene.

RESUMEN

Las incisiones en el triángulo femoral comunmente usadas para la operación en los vasos femorales pueden extenderse por una técnica especial hasta la fosa ilíaca, exponiéndose así satisfactoriamente el tronco vascular a partir de la bifurcación de la aorta hasta el vértice del triángulo femoral. Debido al sacrificio mínimo del tejido y la función, la reparación quirúrgica es fácil.

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No man says in the morning: 'A day is soon over, let us wait for night.' So far from that, we are musing at eve on what we shall do on the morrow. We should be very sorry to spend a single day at the mercy of the weather and troublesome persons; we should not dare to leave the disposal of a few hours to chance; and we are right. For who can count on spending one hour free from the spleen, unless he takes care to fill that short space as he would choose? However what we should never dare count upon for an hour we will sometimes count upon for a whole lifetime, and say: 'What fools we are to be so troubled about the future!—that is, What fools we are not to trust our fate to chance, and to provide for the interval between us and our death.'

—*Vauvenargues*

A Study of Ureteropelvic Obstruction and Its Treatment

Report of 27 Cases
and
Introduction of
a New Nephrostomy Tube and Ureteral Splint

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DURING the past two decades much stimulating work has been done on the surgical treatment of ureteropelvic obstruction in an attempt to save renal parenchyma that has been sacrificed in the past. Different methods of repair have been devised to relieve the obstruction and to regain the use of the remaining kidney tissue.

By far the two most popularized surgical methods of plastic repair are the Foley Y plasty[1] with variations and the intubated ureterostomy procedure advocated by Davis.[2] These procedures utilize some form of ureteral splint to gain their best results. The development of a nephrostomy tube by Cumming provided a splint over which the repaired ureteropelvic juncture could lie during the healing period, and this tube has added great impetus to the attempt to solve the problem.

During the past five years the members of the Hawes Clinic and their associate, Dr. P. L. Freeman, had occasion to operate on 29 kidneys in 27 patients with hydronephrosis due to noncalculus ureteropelvic obstruction. Of this group, 7, or 24 per cent, had undergone primary nephrectomy because it was the impression that the hydronephrosis had destroyed approximately 90 per cent of the renal parenchyma. This conclusion was a clinical one, made at operation. The remaining 22 kidneys were treated conservatively by one of three procedures: the Foley Y plasty, the severing of an aberrant vessel with nephropexy, and the use of an intubated ureterostomy with a gallbladder T tube at the site of repair. This study concerns mainly these procedures and an evaluation of end results generally.

Incidence.—In this series there were 15 female and 12 male patients, with 29 kidneys involved. In 16 the condition occurred on the right and in 13 on the left. Two patients had bilateral involvement, and in each case one kidney was removed because of Grade III hydronephrosis and a very thin cortex. The slight predominance of the female over the male may mean nothing so far as this problem is concerned; however, because of the redundancy and varying periods of ureteral obstruction that occur in pregnant women, one wonders whether women do not have noncalculus obstructions of the upper part of the urinary tract more frequently than

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

men do.

Etiologic Factors. — Fundamentally speaking, the etiologic factors break down to three essential abnormalities: (a) obstructing aberrant vessels, (b) intrinsic stricture and (c) adhesive bands. High insertion of the ureter in the pelvis must be considered a cause of obstruction and hydronephrosis, although it was not observed in any of our cases. Congenital valves are also a cause of obstruction and hydronephrosis, but they are infrequent. It must be remembered that a combination of problems may be present. Aberrant vessels or adhesive bands are frequently associated with intrinsic stricture of the ureter. No procedure is complete until every possible cause for obstruction has been explored by calibrating the ureter so that no such stricture will be left behind after removal of an aberrant vessel. In 15 of our cases the obstruction was due to aberrant vessels, in 10 to intrinsic stricture and in 4 to adhesive bands. In 2 cases a combination of adhesive bands and intrinsic stricture was observed.

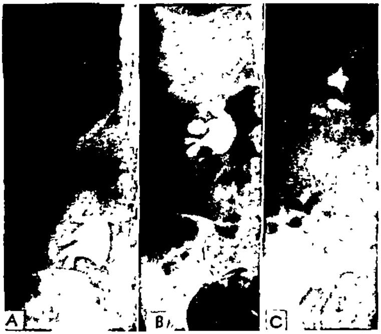

Fig. 1 (Case 1; Mrs. W. H. C., aged 49).—*A*, preoperative retrograde pyelogram with the patient in upright position demonstrating a ptosed hydronephrotic right kidney with obstruction at the ureteropelvic juncture. *B*, twelve-minute delayed emptying time film, demonstrating complete retention of the contrast medium. *C*, six-week postoperative retrograde pyelogram; Foley plastic operation with splinting of the ureter and nephrostomy drainage. Note the reduction in size of the hydronephrosis and the patent ureter. The pathologic lesion was stenosis of the ureteropelvic juncture with no aberrant vessel. Preoperatively the patient had chills, fever, recurrent pyuria, and dull aching pain in the right side of the back. One year after the operation patient had remained well.

Symptoms.—In the majority of cases the principal symptom is pain in the loin on the involved side; this may be mild or severe. In some cases there are no complaints at all, the process being discovered in routine analysis or as part of a workup conducted because of persistent pyuria. I have observed bilateral congenital ureteropelvic obstruction in 2 cases in which the only complaint was of painless hematuria and the patient came to have this condition treated. Gastrointestinal symptoms are common and confusing; and the pain may be like a gas pain and often is associated with nausea and vomiting. Palpable masses are not common but sometimes are the presenting complaint. Symptoms referable to the lower part of the urinary tract are not common but do occur.

Diagnosis.—The diagnosis is made by retrograde pyelographic study. In several cases of recent date the condition would have been completely missed if retrograde studies had not been done, because the intravenous studies revealed no abnormality. When mild early obstruction is detected, the best results are obtained by the methods outlined. Films showing delayed emptying time provide a good picture of renal status and the patency of the ureteropelvic juncture. This procedure should be carried out as a part of the workup in every case of ureteropelvic obstruction. The thickness of the cortex in a case of Grade 3 or Grade 4 hydronephrosis can be determined by roentgen methods with a view to ascertaining whether conservative treatment is valid or not. The exact causes of obstruction, however, can be determi only at operation and even then sometimes with difficulty. The use of aortographic technics is being popularized and may offer something further in the way of more accurate preoperative diagnosis.

Treatment.—The successful treatment of hydronephrosis due to noncalculus ureteropelvic obstruction requires knowledge of the etiologic factors involved in this condition and a proper recognition of them at the time of operation. The method of treatment depends upon the problem presented. It is our hope that this group of cases will provide the basis for an advance in the evaluation of procedures currently in use.

Henline and one of us (C. J. H.)[3] in 1948 reported 52 operative cases of ureteropelvic obstruction and concluded that the Foley Y plasty was generally more successful in their hands when it was combined with nephrostomy drainage and splinting of the ureter for six weeks. There has been much controversy with regard to the length of time for which the splinting catheter and the nephrostomy tube should remain in place after the operation. Many urologists maintain that eight to ten days is sufficient; in our opinion, however, the majority agree that six weeks is the ideal period. The splinting catheter maintains proper alignment of the ureter while postoperative fixation of tissue occurs. Since the final result depends on the patency of the ureteropelvic juncture plus a non-kinked ureter, it would seem that one should be in no hurry to remove the splinting catheter. Davis, in experimental work on dogs, proved the efficacy of the six-week intubation by showing that this length of time is needed to allow the mucosa and muscularis or fibrous tissue to bridge the gap of a ureterostomy incision. He also showed how peristalsis returns to a plastically repaired ureter. The effect of infection on the healing process and therefore the length of time for which intubation will be required is a question to be decided by time.

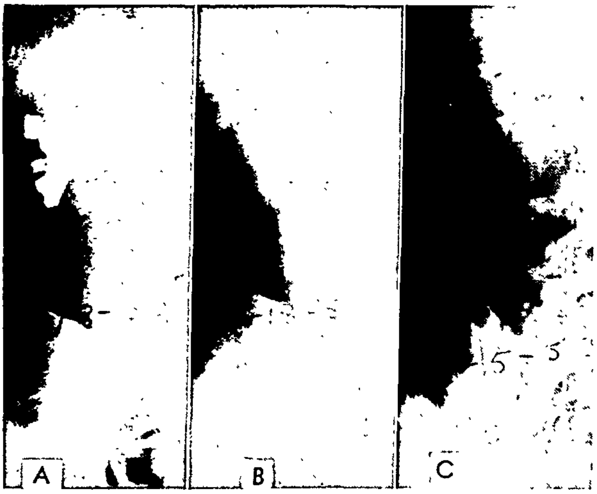

Fig. 2 (Case 2; Mr. T. H., aged 28).—*A*, preoperative retrograde pyelogram with the patient in the upright position, demonstrating a hydronephrotic right kidney with ureteropelvic obstruction. *B*, twelve-minute delayed emptying time film, showing complete retention of the dye. *C*, seventeen-day postoperative pyelogram, showing a decrease in the hydronephrosis and patent ureter. This patient's complaints were all gastrointestinal, nausea, vomiting and epigastric pain being the predominant ones. A Foley Y plastic operation was performed, and the splinting tube was removed in seventeen days. The pathologic lesion was an aberrant vessel and ureteropelvic stenosis. The splint was removed too soon, but the patient resided over a thousand miles away and insisted that it be removed before he returned home. Retrograde pyelogram taken one year after the operation shows the right upper portion of the urinary tract to be normal.

Furthermore, the surgical procedure chosen must be the one best adapted to the correction of a given deformity. The technic used should restore a satisfactorily draining pelvic-ureteral outlet.

The problems mentioned earlier can be solved by various methods, but all complete plastic repairs need prolonged nephrostomy drainage and splinting of the repair area. When this is neglected, secondary contracture and distortion at the site of the repair will vitiate the initial surgical correction, no matter how meticulous the technic.

Henline and one of us (C. J. H.)[3] in 1948 concluded that their success in con-

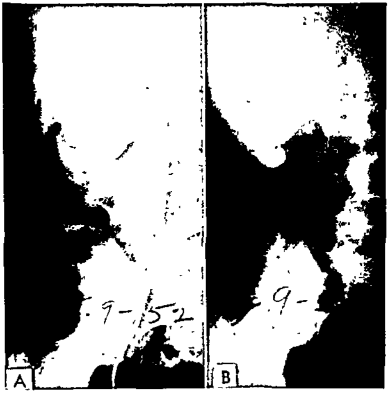

Fig. 3 (Case 3; H. C., aged 46).—This patient was hospitalized on account of epigastric pain radiating to the right side of the back. Urinalysis was normal. *A*, right retrograde pyelogram, demonstrating Grade IV hydronephrosis with ureteropelvic obstruction. The left kidney was normal. *B*, twelve-minute delayed emptying time film, showing complete dye retention. At the time of operation the renal parenchyma was so thin that it seemed any plastic procedure on the ureteropelvic juncture was doomed to failure; consequently a nephrectomy was performed.

servative ureteropelvic surgical procedures depended to a great extent on the fulfillment of certain fundamental principles. First, the diagnosis should be made with the aid of a ten-minute delayed roentgen film after retrograde pyelographic study. The site of the obstruction can be seen, and the delay in the emptying time is apparent. Second, the exact cause of the obstruction must be sought and corrected at the time of operation. Adequate visualization at operation is of prime importance. Henline expressed the opinion that intrinsic stenosis at the ureteropelvic juncture is the most common cause of obstruction. If aberrant vessels or bands are present, their separation may relieve only part of the cause of the obstruction. The intrinsic stenosis should always be looked for and remedied if success is to be attained.

The third principle is that the deformity must be adequately corrected. Generally speaking, a longitudinal incision is made at the ureteropelvic juncture, as in the Davis procedure. This may or may not be extended into the Foley Y plasty procedure, depending upon the redundancy of the pelvis and the length of the stricture present. Portions of grossly redundant pelves can be removed, with extension of one of the arms of the Y plasty. If there is a fibrosed area in the ureter, this area may have to be excised as described by Henline and Menning.[4] In the presence of high insertion of the ureter an inverted Y plasty as described by Gibson[5] may be performed, the V of the Y being the ureter and the leg of the Y going down on the pelvis. As described in Henline's article, the method of transplantation of the ureter, together with a rosette of pelvis, to the lower pelvis may be used efficaciously. Fourth, the third principle is likely to fail unless nephrostomy drainage is established to divert the urine and a catheter inserted as a splint down the ureter. As has been stated, these splints should be left in place for six weeks for adequate fixation of surrounding structures and regeneration of ureteral elements. The salient points with regard to diagnosis and surgical correction of ureteropelvic obstruction have been mentioned.

The pitfalls in repair of this deformity consist in severing aberrant vessels without a complete additional calibration of the ureteropelvic juncture and visualization of the pelvis. The use of T tubes for splinting the ureters as employed in 4, or 12 per cent, of our cases is to be frowned upon and has been discarded by us because of poor results. We mention it only to condemn it.

In 7 cases, or 28 per cent, Foley Y plastic procedures were done, and, with fundamentals of [illegible] ied o good results were obtained uniformly Our mortality rate was zero, and to date no postoperative nephrectomies have been needed.

In 10 cases, 37 per cent of the group, aberrant vessels were severed and Lowsley nephropexies performed. These were cases in which a definite kink was observed at the ureteropelvic juncture, and the nephropexy relieved the kink. In all of such cases the ureteropelvic juncture should be visualized from the inside and calibrated. This procedure was carried out in some of these cases, but not in all as it should have been.

The most commonly used splinting catheter and nephrostomy tube is the one devised by Cumming and bearing his name. The main disadvantage of this tube is that the splint is necessarily removed with the nephrostomy tube. Henline and one of us (C. J. H.) used a No. 10-12 urethral catheter for the ureteral splint and a wing tipped urethral catheter for the nephrostomy tube.

It occurred to one of us (G. A. H.) that the use of a polyethylene tube passed through an extra lumen of a Foley bag catheter, bridging the ureteropelvic repair area, would be a step in the right direction. This would reduce to a minimum all irritating factors and possibly reduce infection at the site of repair.

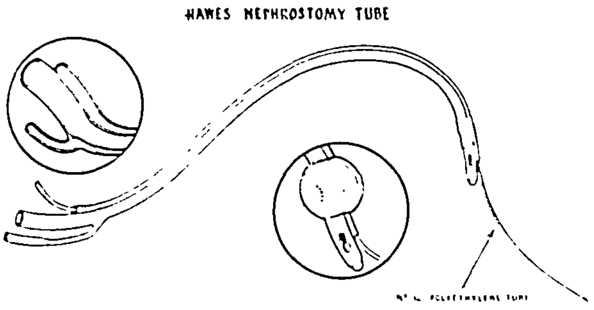

Fig. 4.—Hawes Nephrostomy Tube. (Manufactured by The American Cystoscope Makers, Inc.) This nephrostomy tube consists of a No. 22 F 30 cc. Foley bag catheter, with a second lumen permitting the passage of a No. 12 F polyethylene tube, which is passed down the ureter to act as a splint. The lowermost insert demonstrates the bag inflated, with the polyethylene tube passing through the second lumen of the Foley catheter. The upper insert is a sagittal section of the distal portion of the catheter, demonstrating the lumens for urinary drainage, for the polyethylene tube and for distention of the Foley bag.

With this in mind, a tube was devised in which a polyethylene tube would be used as a splinting catheter and could be left indwelling at various levels down the ureter. It could be removed at any time, and its firm consistency would keep it from working out. The main advantage in removing the polyethylene splint with the nephrostomy tube in place is that one can immediately inject skiodan into the renal pelvis and outline the ureter and pelvis, thereby visualizing the status of the repair before removal of the nephrostomy tube.

This new tube is illustrated and described in Figure 4. It is hoped that it will help solve some of the surgical problems connected with ureteropelvic obstruction.

SUMMARY

1. The etiologic factors, symptoms, diagnosis and treatment of ureteropelvic obstruction are described.

2. An evaluation of methods of treatment is made from the experience of 27 patients with 29 kidneys treated.

3. The pitfalls of inadequate surgical examination and treatment are emphasized.

4. The new type of nephrostomy tube with a polyethylene splinting catheter is presented as an addition to the treatment of noncalculus ureteropelvic obstruction.

SUMARIO

1. São descritos os fatores etiológicos, sintomas, diagnóstico e tratamento da obstrução ureteropélvica.

2. Com a experiência obtida com 27 pacientes e 29 rins tratados, é feita uma

apreciação dos métodos de tratamento.

3. São acentuados os perigos do exame e tratamento cirúrgicos inadequados.

4. É apresentado novo tipo de tubo de nefrostomia por meio de cateter modelador ce polietileno.

RESUMEN

1. Se describen los factores etilógicos, síntomas, diagnóstico y tratamiento de la obstrucción ureteropélvica.

2. Se hace la valorización de los métodos de tratamiento a partir de la experiencia obtenida en 27 pacientes a los cuales se trató 29 riñones.

3. Se señalan los puntos sobresalientes de las exploración y tratamiento quirúrgicos inadecuados.

4. Se presenta un nuevo tipo de tubo para nefrostomía con un catéter de polietileno.

RIASSUNTO

1. Vengono descritti i fattori ettiologici, i sintomi e la cura delle ostruzioni uretero-pelviche.

2. I metodi di cura sono stati valutati sulla base dei risultati ottenuti in 27 pazienti (29 reni trattati).

3. Si deve porre grande attenzione ai danni che derivano da esami o cure insufficienti.

4. Esiste un nuovo tipo di tubo per nefrostomia utile per la cura delle ostruzioni ureteropelviche non calcolose.

ZUSAMMENFASSUNG

1. Es werden die Ursachen, die Symptome, die Diagnostik und die Behandlung der Obstruktion des Übergangs des Nierenbeckens in den Harnleiter beschrieben.

2. Der Wert der Behandlungsmethoden wird auf Grund der Erfahrungen an 27 Patienten, bei denen 29 Nieren behandelt wurden, geprüft.

3. Auf die Gefahren unzureichender chirurgischer Untersuchung und Behandlung wird hingewiesen.

4. Als neuer Beitrag zur Behandlung von nicht durch Steine hervorgerufenen Verstopfungen des Überganges des Nierenbeckens in den Harnleiter wird eine neue Form eines Nierendrainagerohrs mit einem schienenden Polyethylenkatheter eingeführt.

RÉSUMÉ

1. Les facteurs étiologiques, les symptômes, le diagnostic et le traitement de l'obstruction urétéro-pelvienne sont discutés.

2. Les méthodes de traitement sont étudies sur la base d'une expérience de 27 malades avec 29 reins traités.

3. Les dangers de l'examen chirurgical et du traitement inadéquants sont soulignés.

4. Le nouveau type de tube de néphrostomie avec sonde à polyéthylène est présenté.

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Hemorrhage as a Complication of Peptic Ulcer

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THIS study was undertaken in full realization of the confusion and uncertainty that exists today in medical literature and practice with reference to the proper treatment of bleeding peptic ulcer. Although it is the most common complication, the treatment has as yet not crystallized and is obscured by argument, debate and controversy. It is our intention to make an effort to clarify this known situation in the light of these reported experiences.

The source of our material is the list of admissions to the University of Oklahoma Hospital and affiliated hospitals during the past decade. We have observed a somewhat higher percentage of bleeding ulcers than has been reported from other parts of the United States.[1] Of a total number of 1,579 ulcers there were 437 that bled or 27.6 per cent. The greatest percentage occurred in 1953, when 32 per cent of ulcers admitted were bleeding. Likewise, we noted the usual seasonal variation, with an exception, as well as sex and age incidence.

In our opinion it is important to differentiate between the bleeding and the hemorrhaging ulcer. With the former there is usually a situation characterized by some little bloody mucus in the vomitus and a few tarry stools. This situation is easily controlled as compared to that of the patient admitted with vascular collapse, circulatory instability and the color characteristic of extensive blood loss. We have rather arbitrarily set up, as a criterion, 4,000,000 red blood cells per cubic millimeter, with 12 Gm. of hemoglobin, as the point of division between simple bleeding and hemorrhage. By this standard, 20.8 per cent of the ulcers in our series were characterized by bleeding; we diagnose massive hemorrhage only when, on the patient's admission, the hemoglobin content of the blood is below 7.5 Gm. or the erythrocyte count below 2,500,000 per cubic millimeter, with a hematocrit reading below 25 per cent packed cell volume. Twenty-two per cent of our patients were classified as having massive hemorrhage.

It is important to take note of the age of the patient with hemorrhage, particularly if he is in the sixth or seventh decade of life. As has been emphasized a person at that age level has suffered longer from the disease; there are more scarring and callus, deeper penetration and more rigid vessels. Likewise, the heart, kidney and brain are more susceptible to the anoxemia that accompanies massive hemorrhage. Elderly patients cannot bear blood loss well.[2] It should be mentioned, however, that younger persons may also die of hemorrhage.

We have found no basis for the sometimes expressed opinion that hematemesis is more serious than melena.[3] Its principal effect is to bring the patient more promptly to the doctor, since the vomiting of bright red blood is one of the most alarming experiences of life.

Roentgenologists vary as to the advisability of examination during or soon after the hemorrhage. If the examination can be accomplished without trauma, it would seem safe, particularly if there is any ques-

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

tion as to the source of the hemorrhage. In a good percentage of cases this can be determined by roentgen study or operation.

We have also been unable to find a great difference between the prognosis of gastric and that of duodenal ulcer; so little, in fact, that there is no reason why examination or treatment should be different. The possibility of gastric ulcer, however, should always be considered. The diagnosis of a hemorrhaging gastrojejunal or stomal ulcer is sufficient to indicate surgical attack without further examination provided the general condition of the patient is good. Esophageal ulcers and diverticulum ulcers have been so few in this series that we do not consider it necessary to include them.

With the diagnosis accurately made, what is the proper treatment? If the patient is classified as "bleeding," watchful, expectant medical therapy is definitely indicated. If hemorrhage is present, surgical treatment fulfills all that can be reasonably expected. When operation has been decided upon, what should be its type and its extent? In our opinion the best results may be anticipated from adequate resection by the Hoffmeister type of Polya operation.

After such procedure, however, one cannot tell the patient that he has been cured. In our cases recurrent hemorrhage has occurred after all of the recognized procedures: (1) the attempt to seize and control the bleeding point; (2) vagotomy and gastrojejunostomy; (3) antral occlusion and resection, and (4) the various types of resection including the ulcer area. All have been followed by stomal ulcers and hemorrhage. In such a situation, we are faced with a precarious choice—not alone as to the surgical procedure but as to postoperative advice. The best results reported in the past year have occurred after adequate resection and vagotomy.[4] The surgeon's individual experience must direct the decision.

No surgical problem is more pressing than that presented by treatment of the complications of hemorrhaging peptic ulcer. Only by experience can we hope to arrive at a satisfactory solution. Gastric resection is not to be undertaken lightly. It should be classified with the amputation of an extremity—the result is always a cripple. Each surgeon must be guided by the results obtained. It does seem, however, reasonable to substitute a digestive cripple for a patient who lives constantly under the threat of massive hemorrhage.

SUMMARY

The authors presented the results in a study of these 137 cases. The incidence of hemorrhage is recorded, thus somewhat clearing the etiologic background. A working classification is presented. The still obscure question of therapy is discussed. Finally, the authors' opinion as to the most effective procedure, as learned from this study, has been mentioned.

Hemorrhage is the most common complication of ulcer. It is likewise the most urgent and dramatic. Its frequency is increasing in the same proportion as that of ulcer itself. The usual seasonal increase in ulcer symptoms of spring and autumn likewise shows an increase of associated hemorrhage. Added to this there is a marked increase in December. This may be explained by the celebrations so common at that time or by income tax deadlines.

The incidence of hemorrhage in women is likewise increasing. The explanation may lie in the so-called "coffee breaks" in offices and industrial plants and the marked increase in cigarette consumption among women, as well as the fr

cocktail parti

Earlier

best hope of reducing the mounting incidence of this complication.

SUMARIO

A hemorragia é a complicação mais comum da úlcera, sendo concomitantemente a de maior urgência e dramaticidade. Sua freqüência tem aumentado na mesma proporção que a da própria úlcera. O recrudescimento dos sintomas da úlcera na primavera e no outono é acompanhado por aumento da associação da hemorragia. Registra-se ainda acentuado aumento em Dezembro; tal fato pode ser explicado pelas comemorações tão comuns nessa época, ou pelas dificuldades decorrentes do impôsto de renda.

Da mesma forma tem aumentado a incidência de hemorragia em mulheres. Tal fato pode ser devido ao uso freqüente do café em escritórios e fábricas e ao aumento do consumo de cigarros entre mulheres, bem como aos freqüentes "cocktail parties" freqüentados por ambos os sexos.

O tratamento cirúrgico mais precoce oferece a melhor possibilidade para se reduzir a ascendente incidência desta complicação.

RÉSUMÉ

L'hémorragie est la complication de l'ulcère la plus courante. Elle est aussi la plus urgente et la plus dramatique. Sa fréquence est proportionnelle à celle de l'ulcère. L'augmentation saisonnière habituelle des symptômes de l'ulcère au printemps et en automne montre également une recrudescence da l'hémorragie. A cela s'ajoute qu'il y a une augmentation marquée en décembre, ce qui peut s'expliquer par les fêtes de cette époque de l'année, ou par les échéances des impôts sur le revenu.

La fréquence de l'hémorragie chez les femmes augmente de façon semblable. L'explication peut en être donnée par les goûters dans les bureaux et les exploitations industrielles, par l'abus tu tabac que font actuellement les femmes, ainsi que par les réunions de cocktails auxquelles prennent part les deux sexes.

C'est le traitement chirurgical précoce qui donne les meilleurs résultats quant à la diminution de la fréquence de cette complication.

RIASSUNTO

L'emorragia è la complicanza più frequente dell'ulcera, oltre ad essere la più urgente e drammatica. La sua frequenza è aumentata con l'aumento delle ulcere; essa è più comune in primavera e in autunno, quando si hanno le riaccensioni dei disturbi ulcerosi; frequente anche in dicembre in causa delle festività, che si celebrano in questo mese, e della scadenza delle tasse.

Sono in aumento le emorragie nelle donne a causa delle abitudini maschili che esse vanno acquistando durante il lavoro, del fumo e dell'uso di liquori.

La cura chirurgica precoce è il sistema migliore per combattere questo aumento di frequenza.

RESUMEN

La hemorragia es la complicación más frecuente de la úlcera, siendo también la más urgente y dramática. Su frecuencia aumenta en la misma proporción en que aumenta la incidencia de úlcera encontrandose aumento de la hemorragia en los períodos de mayor sintomatología de primavera y otoño. Además de ésto existe un aumento notable en diciembre, lo cual es explicable por las celebraciones propias del mes o por los impuestos.

La incidencia de hemorragia en la mujer ha sido creciente, explicándose por la costumbre de tomar café en las oficinas y plantas industriales, así como por el aumento marcado del consumo de cigarrillos, y finalmente por las frecuentes fiestas con-

curridas por ambos sexos.

El tratamiento quirúrgico temprano ofrece las mejores esperanzas de reducir la incidencia de esta complicación.

ZUSAMMENFASSUNG

Die häufigste Komplikation des peptichen Geschwürs ist die Blutung. Sie stellt gleichzeitig die dringlichste und dramatischste Nebenerscheinung dar. Ihre Häufigkeit wächst im gleichen Verhältnis mit der Zunahme der Geschwüre. Auch das saisonmässige Ansteigen der Geschwürssymptome im Frühling und im Herbst ist von einer entsprechenden Zunahme von Blutungen begleitet. Ein erhebliches Ansteigen lässt sich ausserdem im Monat Dezember beobachten. Das lässt sich vielleicht durch die vielen Festlichkeiten um diese Jahreszeit oder durch das Herannahen der Steuertermine erklären.

Es hat sich ferner eine Zunahme der Häufigkeit von Magenblutungen bei Frauen beobachten lassen. Hierfür kann man vielleicht die sogenannten Kaffeepausen in den Büros und in den Fabriken sowie den wachsenden Zigarettenverbrauch der Frauen und die häufigen von Angehörigen beider Geschlechter besuchten "cocktail parties" verantwortlich machen. Die besten Aussichten zur Herabsetzung der ständig zunehmenden Komplikation der Blutung bietet die frühere Anwendung chirurgischer Behandlung.

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We men and women are all in the same boat, upon a stormy sea. We owe to each other a terrible debt.

—*Chesterton*

We live at the mercy of a malevolent word. A sound, a mere disturbance of the air, sings into our very soul sometimes.

And a word carries far—very far—deals destruction through time as the bullets go flying through space.

—*Conrad*

Neurofibroma of the Stomach

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PETAH TIQUA, ISRAEL

BENIGN tumors of the stomach have been described from time to time in the roentgenologic and surgical literature as unusual neoplasms. Recently we encountered a case of gastric neurofibroma. The fact that the literature contains only occasional reports of localized gastric neurofibroma, the symptoms of which can to some extent simulate a malignant tumor, justifies sufficiently its recording.

Neurofibromas are mesenchymal tumors derived from the sympathetic fibers of the myenteric, Auerbach's plexus and from the submucous, Meissner's plexus. Pathologists differ as to the tissue of origin. Some maintain that these tumors arise from the ectodermal cells of nerve sheaths; others, that they are of mesodermal origin (connective tissue, fat, blood vessels, lymphoid tissue).

The true incidence of gastric neurofibromas is obscured because of difference of opinion among pathologists. Minnes and Geschickter reported that 10 per cent of all benign tumors of the stomach are neurofibromas.

REPORT OF CASE

A single woman aged 46, whose past history was irrelevant, had been perfectly well until ten months prior to admission, at which time she complained of a bitter taste in the mouth. A routine examination elsewhere had revealed diabetes, with a blood sugar level of 195 mg. and 4% in the urine. Treatment consisted of a diet without insulin. For the past three months she had been complaining of upper abdominal discomfort, feeling of pressure, tenderness; some improvement after meals. There had been loss of weight of about 13 Kg. and persistent constipation.

Physical Examination: In the upper part of the abdomen, toward the right lateral aspect, a mass the size of a tangerine could be palpated. It was freely movable to the left but sometimes entirely escaped the palpating finger.

Laboratory Data: The laboratory report read as follows: "B.S.R. 19/33. B.P.R.R. 150/90. blood sugar normal. Hgb 10.5 Gm., bilirubin 0.3 mg.%, sugar 124 mg.%, prothrombin test 90%, gastric acidity 0/15 after histamine. Cholecystography, intravenous pye-

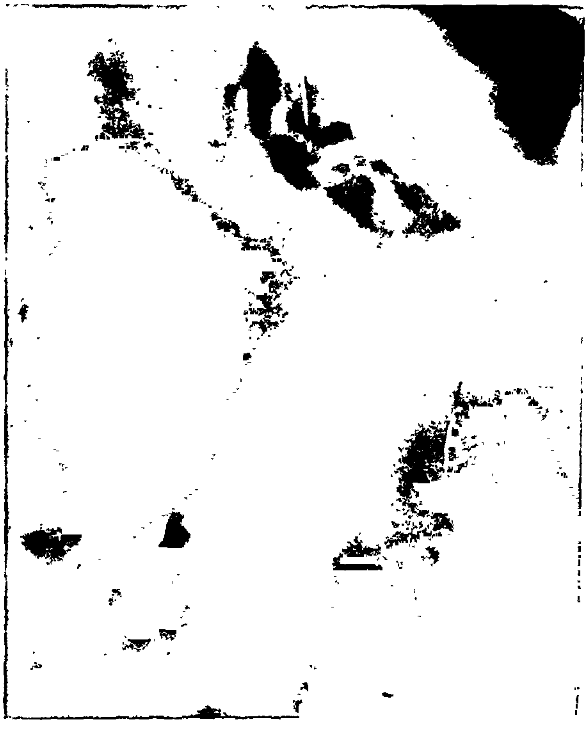

Fig. 1.—Angulation of the stomach on the greater curvature is clearly visible.

Submitted for publication Sept. 26, 1954.

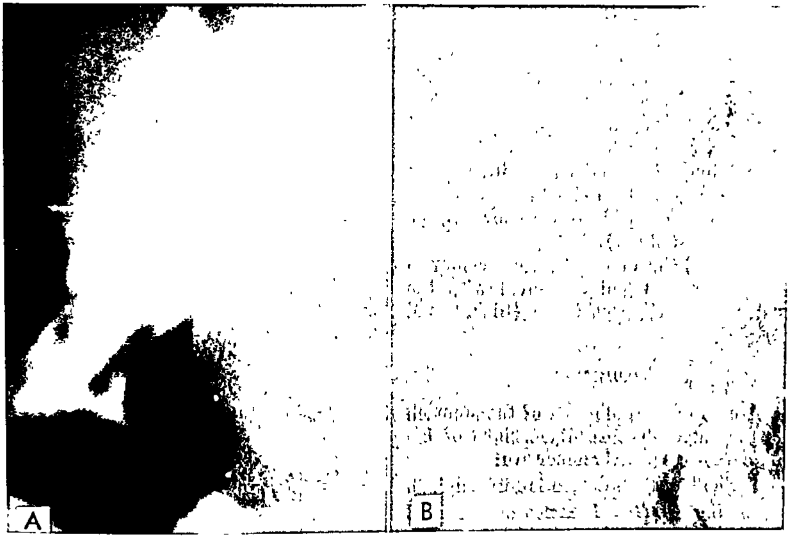

Fig. 2.—*A*, sharply defined mass projecting into the lumen. Patient in supine position. *B*, sharply defined mass with recognizable mucosal folds. Patient in prone position.

lography, barium enema negative."

Roentgen Examination: A film taken after a contrast meal revealed a lesion the size of a tangerine, sharply defined and smoothly rounded, projecting into the lumen of the antral part of the stomach. The mucosa was normal in pattern and appearance; the normal mucosal folds of the opposite wall were recognizable through the area of translucence caused by the tumor. A remarkable observation was a sharp angle formed by the normal gastric wall and the edge of the tumor as it projected into the lumen. The gastric wall was pliable, and the peristaltic waves ran undisturbed (Fig. 1).

In the differential diagnosis must be considered: (1) benign gastric polyp, (2) ectopic pancreatic tissue and (3) certain extrinsic masses.

Operative Procedure: With the patient under general anesthesia, the abdomen was opened by a median cut from the xiphoid process to the umbilicus. No peritoneal effusion was observed. About 4 to 6 cm. from the pylorus on the anterior wall of the stomach was a mass, freely and easily movable. It was easily removed by peeling it out from the stomach without opening the mucosa. The stomach was then closed by two layers of Sero-Serosa, after which the abdominal wall was closed. Recovery was uneventful, and the patient was discharged after ten days.

Pathologic and Microscopic Examination (Dr. Kendy, service of Dr. Casper): The gross specimen consisted of a piece of tissue measuring 8 cm. in length and having a diameter of 5 cm., well limited within a capsule. It showed partly a cystic pattern filled with a gelatinous substance and partly a solid white structure (Fig. 5*A*).

Microscopic examination revealed a fibroma rich in cells, probably a neurofibroma; the cells were arranged in the shape of sheaves. There was no sign of mitosis; some signs of degeneration and necrosis were ted. The was no evidence of maligna (5*B*).

COMMENT

From the roentgenologic point of view, the most important factor in the recognition of benign tumors is the technic chosen for roentgen examination. Rigler and Ericksen require the use of compression, underfilling of the stomach with barium and overpenetration in the taking of roentgenograms; otherwise the tumor may be overlooked (Fig. 4).

As an aid in diagnosis, I use compression spot films and exposures with the patient in various positions (Figs. 2 and 3).

SUMMARY

A case of neurofibroma of the stomach is presented. The roentgen signs of benignancy in a gastric tumor are:

1. The translucent area is intraluminal.
2. The surface is smooth and well rounded.
3. Sharp borders exist between the gastric wall and the tumor, with sharp angles at the juncture.
4. The mucosa is normal.
5. Peristalsis is uninterrupted. (Overdistention of the stomach with barium may cause the lesion to be overlooked.)

In the case here reported, operation confirmed the roentgen evidence of benignancy. A freely movable tumor 4 by 6 cm. was peeled out from the pylorus, with the mucosa intact.

SUMARIO

É apresentado um caso de neurofibroma do estômago. Os sinais radiológicos da benignidade de um tumor gástrico são:

1. A área translúcida é intraluminal.
2. A superfície é lisa e bem arredondada.
3. Existem limites nítidos entre a parede gástrica e o tumor, com ângulos agudos em sua junção.

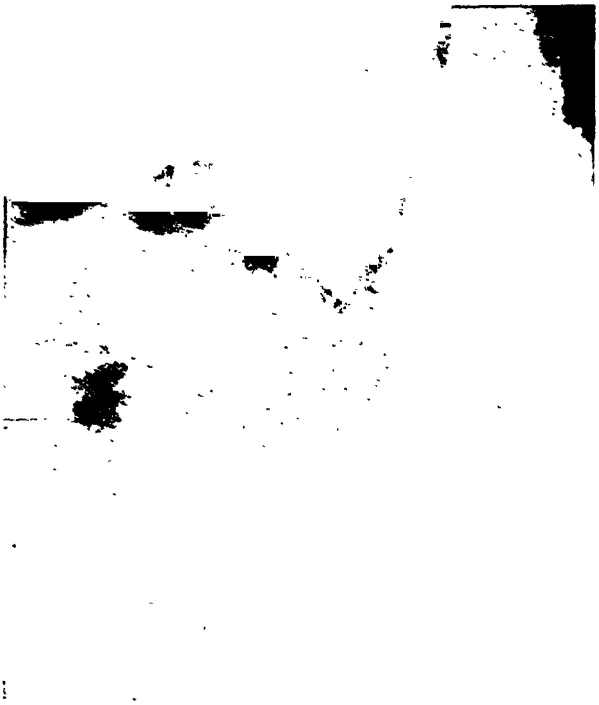

Fig. 3.—If stomach is overextended with barium the tumor may be overlooked.

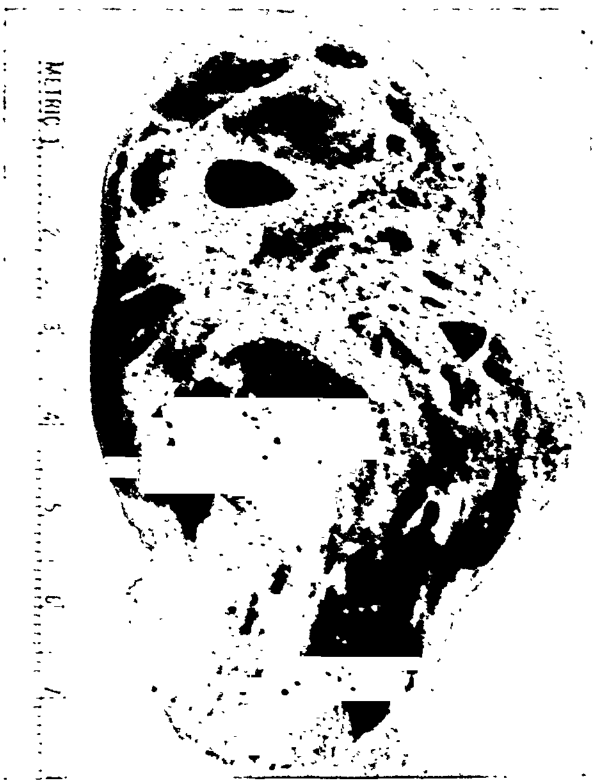

Fig. 4.—Gross specimen of tumor removed at operation, showing pattern and structure, partly cystic and solid.

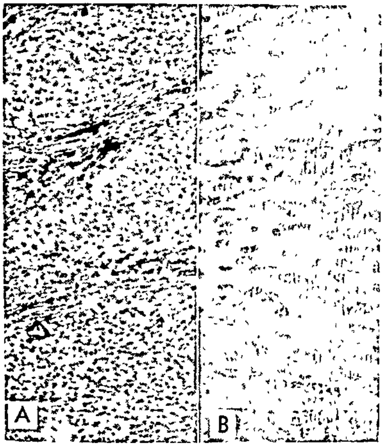

Fig. 5.—A, section of a fibroma rich in cells. *B*, high power magnification showing cellular detail.

4. A mucosa é normal.

5. Não há interrupção do peristaltismo (a superdistensão do estômago com bário pode fazer com que a lesão não seja notada).

No caso apresentado a operação confirmou os sinais radiológicos de benignidade, tendo sido extirpado um tumor móvel de 6 x 4 cm da região pilórica, mantendo-se intacta a mucosa.

RIASSUNTO

E' presentato un caso di neurofibroma dello stomaco. I segni radiologici di benignità in un tumore gastrico sono:

1. La superficie è liscia e ben arrotondata.

2. Esistono limiti netti tra la parete gastrica e il tumore.

3. La mucosa è normale.

4. La peristalsi non è interrotta (si ricordi, tuttavia, che l'eccessiva distensione dello stomaco con bario può portare ad errori d'interpretazione).

Nel caso riferito l'operazione confermò la diagnosi radiologica. Venne asportato dal piloro un tumore liberamente mobile di 4-6 cm., con mucosa intatta.

RESUMEN

Se comunica un caso de neurofibroma gástrico. Los signos roentgenológicos de benignidad en un tumor gástrico son los siguientes:

1. El área translúcida es intraluminal.

2. La superficie es lisa y bien redondeada.

3. Existen bordes marcados entre la pared gástrica y el tumor, con ángulos definidos en su unión.

4. La mucosa es normal.

5. La peristálsis no se interrumpe. (La sobredistensión del estómago con bario puede producir el enmascaramiento de la lesión).

En el caso que aquí se comunica la operación confirmó la evidencia radiológica de benignidad, enucléandose del píloro con la mucosa intacta, un tumor móvil de 4 por 6 centímetros.

ZUSAMMENFASSUNG

Es wird über einen Fall von Neurofibrom des Magens berichtet. Die röntgenologischen Zeichen der Gutartigkeit einer Magengeschwulst sind:

1. Das strahlendurchlässige Gebiet befindet sich innerhalb der Magenhöhle.

2. Die Oberfläche ist glatt und gut abgerundet.

3. Die Abgrenzung zwischen der Magenwand und der Geschwulst ist scharf, mit scharfen Winkeln an den Verbindungsstellen.

4. Das Schleimhautbild ist normal.

5. Die Peristaltik ist nicht unterbr
(Durch Überdehnung des Magens m
Bariummahlzeit kann die Erkrankun
Beobachtung entgehen.)

In dem hier berichte

Röntgenbefund einer gutartigen Geschwulst durch Operation bestätigt. Ein frei beweglicher Tumor von den Ausmassen von 4 x 6 cm wurde aus dem Pylorus herausgeschält. Die Schleimhaut war intakt.

RÉSUMÉ

Un cas de neurofibrome de l'estomac est présenté. Les signes radiologiques de bénignité d'une tumeur gastrique sont les suivants:

1. Zone translucide intralumineuse.
2. Surface douce et bien arrondie.
3. Bords bien dessinés entre la paroi gastrique et la tumeur, avec angles aigus entre la tumeur et l'estomac.
4. Muqueuse normale.
5. Péristaltisme ininterrompu (une surdistension de l'estomac avec du baryum peut masquer la lésion).

Dans le cas rapporté ici l'opération a confirmé la preuve radiologique de bénignité. Une tumeur mobile de 4 à 6 cm a été décortiquée du pylore, avec une muquese intacte.

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It was only very slowly and reluctantly that the church sanctioned the dissection of corpses in connection with the study of medicine. The pioneer in dissection was Vesalius, who was court physician to the Emperor Charles V. His medical skill led the Emperor to protect him, but after the Emperor was dead he got into trouble. A corpse which he was dissecting was said to have shown signs of life under the knife, and he was accused of murder. The Inquisition was induced by King Philip II to take a lenient view, and only sentenced him to a pilgrimage to the Holy Land. On the way home he was shipwrecked and died of exhaustion.

—*Russell*

Section on Ophthalmology and Otorhinolaryngology

PAUL C. CRAIG, M D., F.A.C.S., F.I.C.S., EDITOR

A New Material for Implantation In Cases of Atrophic Rhinitis

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ATROPHIC rhinitis has long presented a difficult problem for the rhinologist and an uncomfortable nasal disorder for the person who suffers from it.

In patients with atrophic rhinitis, as the name implies, there is shrinkage of the tissues lining the nasal cavity, accompanied by alteration in the nature of the cells of the mucosa to such a degree that their physiologic function may be entirely lost. The result is that the ciliated cells, with their important activity, are no longer present. Instead, the surfaces are dry and crusted, making a favorable culture medium for various inhaled organisms. This condition produces a foul odor, which is evident both to the person concerned and to others nearby, all of which has social implications of considerable importance.

The atrophy of the deeper tissues of the turbinates and of the septum causes enlargement of the intranasal space as a whole, thus producing what is generally known as a rheumy nose. A too spacious nasal cavity of itself is a disorder, since it fails to direct the normal flow of the air stream which is necessary for physiologic effect.

Since the turbinates are factors in some degree in the direction of the inhaled and exhaled air, their atrophy, which may be extreme in cases of atrophic rhinitis, helps to upset the normal nasal function. To correct this loss of substance, I have restored normal tissue relation within the nasal cavity by implanting Ivalon,* a polyvinyl sponge, subcutaneously by the following procedure:

The patient is prepared as for any intranasal operation, and with local anesthesia the skin over the atrophic turbinates is undermined. A piece of the sponge, shaped both in outline and size to produce the desired restoration, is inserted into the subcutaneous pocket.

The extent of the undermining will depend upon the individual requirement. If there is also atrophy of the septum, the cartilage is split and a narrow piece of sponge is inserted there also. If the intranasal space is still too roo
process is repeated as indic
nasal floor. When
been sutured, the
lief almost at onc

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*Ivano, Inc., Chicago.

Submitted for publication March 1, 1954.

The usefulness of this operation is not necessarily confined to the patient with atrophic rhinitis. Any condition in which the nasal cavity is enlarged sufficiently to disturb nasal function can be reconstructed in the same manner. As an example, a patient was seen who had undergone, eight years earlier, a submucous resection for frequent attacks of rhinitis. This operation did not succeed in preventing the repeated head colds, and the patient consulted another physician, who told him that his turbinates were the cause, as they were too large. The turbinates were then amputated by repeated operations until only a minimal amount of turbinate structure remained. This left the patient with too much room in his nose, and his colds still persisted. He had treated himself and found some relief by putting pledgets of wet cotton inside his nose.

As far as the increased space in the nose is concerned, this condition is similar to that associated with atrophic rhinitis, and a reconstructive operation was done in the manner aforedescribed; by implanting pieces of the polyvinyl sponge wherever there had been to great a loss of tissue. The patient felt relieved at once, and later there was also improvement in his general physical condition; as shown by a gain in weight and freedom from his formerly frequent colds.

The same sponge material has been employed successfully by other surgeons for the correction of a variety of conditions in which there is a need of filling empty spaces; for instance, after the excision of parts of a lung. It has also been studied experimentally in animals, in which it has also proved not to cause tissue reaction.

This material is not a native sponge, as are the commonly known vegetable sponges; it is an artificial product derived from petroleum, and thus related—but only by association—to paraffin, from which it differs in various characteristics. The sponge is prepared from vinyl alcohol by an aerating method that creates a finely porous, foamlike structure. In this state it is fixed in formaldehyde to make the foam structure permanent.

The sponge, when ready for surgical use, is pure white and generally rubberlike in its elasticity when moist. To maintain this elastic state before its sale it is moistened with glycerin, which is hygroscopic and holds moisture. Before the sponge is used it should be repeatedly rinsed until it is free of all foreign substance, and then allowed to stand overnight in running water. This precaution should leave the sponge thoroughly cleansed.

This material is stable to 120 C., but it shrinks slightly. The sponge should not be wrapped but allowed to float, and should not be handled after boiling until it has been cooled in physiologic solution of sodium chloride.

The sponge can be cut with knife or scissors, while it is still moist and pliable, into any desired size or shape, ready to be inserted at once into the subcutaneous pockets already prepared within the nasal cavity.

In writing of the use of the polyvinyl sponge, some mention should be made of the controversy that has gone on during the past few years concerning the experimental use of cellophane, which in experimental animals has resulted in growths diagnosed as sarcomatous. On this point a number of details should be made clear. First of all, observations on animals (rats and mice) should not be unreservedly applied to man. At the time of writing, similar results seem to have been observed in the human subject. It is true that not enough time may not have been allowed to elapse for the development of diagnostic results. In rats, no growth occurred until eleven months or more had elapsed.

A second point, which should not be

overlooked, is that cellophane is a derivative of *cotton*, in contrast to the polyvinyl sponge, which is a *petroleum* product. This difference of source has been studied experimentally with rats, and the reports have stated that both materials and various varieties of them have produced sarcomas, with variation also in the types of growth. Of 23 primary tumors, 17 were fibrosarcomas, 2 liposarcomas, 1 a rhabdosarcoma, and 1 an undifferentiated growth. This diversity in the nature of the growths should have further study, since it may be important.

Subcutaneous transplants were made from these primary growths, and the resulting tumors were carried on successively through as many as five generations. The appearance of the new growth in this series never occurred earlier than eleven months after inoculation. It seems particularly noteworthy that 126 "well-defined" tumors in the series of 199 transplants regressed spontaneously to such a degree that insufficient tissue was left for study.

Another significant point is that some of the tumors metastasized, though details are not given concerning the places where the secondary growths appeared, nor is it stated whether they were true to type. This information would be of interest, since the primary tumors were not uniform.

A point that appears not to have been investigated is how long the animals with tumors would live, if they had not been killed, and what their terminal condition might have shown in relation to the malignant growths.

As far as the polyvinyl sponge used in the operation for intranasal reconstruction is concerned, it has been found inert, producing a minimum reaction or none at all. It serves an equally definite need in other and similar operations. The sponge becomes organized by ingrowth of connective tissue and blood vessels, and in the cases reported has given unusual satisfaction as compared with other material used for similar purposes.

The process of growth of normal connective tissue cells into the sponge structure suggests that of a tissue culture; the walls of the air cells of the sponge act as a support for the new cells, in a manner similar to that of the fibrin fibers that form in tissue culture mediums. The lack of any foreign body reaction of the tissues to the sponge material and their ready organization of it in a perfectly natural manner suggests its suitability as a substitute for human tissues.

The final word concerning the use of these artificial materials must await more and better experimentation. At present there is no evidence that results from any deleterious effect from their use in man.

SUMMARY

The subcutaneous implantation of Ivalone, a polyvinyl sponge, is employed by the author in the treatment of atrophic rhinitis, with excellent results. The technic of insertion is described.

The same material has been employed successfully by other surgeons for correction of a number of conditions in which there is need of filling empty spaces, e.g., after excision of a portion of the lung.

SUMARIO

A implantação sucutânea de IVALONE, uma esponja de polivinil, é empregada pelo Autor, com excelentes resultados, no tratamento da rinite atrófica, sendo descrita a técnica de sua aplicação.

O mesmo material tem sido satisfatoriamente empregado por vários cirurgiões na correção de diversas afecções em que há necessidade de pre-enchimento de espaços vazios, como por exemplo após a [illegible] de parte do pulmão.

RESUMEN

El autor ha obtenidos excelentes en el tratamiento de la rinitis atrófica empleando el "Ivalone," esponja polivinílica, describiendo la técnica de inseración. Dicho material ha sido empleado también con éxito por otros cirujanos en la corrección de cierto número de padecimientos en los cuales se requiere un material para llenar un defecto, v.g. después de la extirpación de un porción de tejido pulmonar.

RÉSUMÉ

L'auteur obtient d'excellents résultats par l'implantation d'Ivalone (éponge de olyvinyl) dans le traitement de la rhinite ophique. La technique est décrite.

Le même matériel a été utilisé avec succès par d'autres chirurgiens pour la correction d'un certain nombre d'états pathologiques (remplissage de cavités, par exemple après une pneumectomie partielle).

ZUSAMMENFASSUNG

Zur Behandlung der atrophischen Rhinitis verwendet der Verfasser die subkutane Einpflanzung von Ivalone, einem Polyvinylschwamm, mit ausgezeichneten Ergebnissen. Er beschreibt die Technik der Einführung des Schwammes.

Dasselbe Material wird von anderen Chirurgen mit Erfolg zur Behandlung anderer Krankheitszustände angewandt, wo leere Räume wie z.B. nach Teilresektion der Lunge auszufüllen sind.

RIASSUNTO

L'Autore si è servito dell'impianto sottocutaneo di IVALONE (spugna polivinilica) per la cura della rinite atrofica, con risultati eccellenti. Viene descritta la tecnica.

Los stesso materiale è stato con successo da altri chirurghi anche per la cura di varie affezioni in cui si richiede un materiale per riempire spazi vuoti, come ad esempio cavità residue a resezione polmonare.

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Beasts have not the high advantages which we possess: but they have some which we have not. They have not our hopes, but then they have not our fears: they are subject like us to death, but it is without being aware of it; most of them are better able to preserve themselves than we are, and make a less bad use of their passions.

—*Laski*

Plastic Repair of the Fractured Nasal Septum

Fundamental Procedures and Applications

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DEFLECTION of the nasal septal cartilage is a common deformity associated with injuries to the nose and may occur in various degrees and forms, with or without fracture of the nasal bones or deformity of the other supporting nasal structures. The degree of deformity depends upon the type and degree of the nasal trauma. Such deformities of the septum may be associated with marked evidence of fracture and angulation and distortion of any portion of the septum. Associated with these there is often distortion of the lateral and alar nasal cartilages, as well as deformities of the nasal bones, which complicate the deformity and its repair. These deformities, especially when marked, interfere with nasal breathing and sinus aeration and drainage, thus adding to the aesthetic problem of dealing with various degrees and types of an internally and externally deformed nose.

Many of these deviations are the result of trauma in childhood, and, though the deformity may be barely noticeable at first, it becomes accentuated as the nasal structures develop into the adult form. The maxillary crests and the vomer are not completely ossified in early childhood, so a slight deflection of these tissues, caused by trauma, becomes more marked as they develop. This is not an uncommon result of trauma resulting from childbirth. There is no such thing as outgrowing a deformity. Early repair, therefore, is of prime importance if these later defects in contour and breathing are to be prevented.

Depending upon the direction, kind and degree of force associated with the injury, deflection of the anterior nasal septum becomes manifest in several ways. The anterior (caudal) end may be deflected to either side of its columellar attachment to a varying degree and may present itself as a perpendicular ridge or a lateral shelf in either nostril. When the dislocation is moderate there is little obstruction to breathing unless it is associated with buckling and fracture, with angulation of the cephalic, quadrilateral portion. When trauma is severe, the deformities of the fractured septum are associated with various deviations and deformities of the bony structure and the outer nasal cartilages that give support and shape to the nasal tip and the lower part of the nasal dorsum. This occurs because of the intimate anatomic relation between the septum, the lateral cartilages and the nasal bones.

A common deformity of the septum occurs at the juncture of the septum and the perpendicular plate of the ethmoid, producing marked obstruction to breathing from septal displacement and thickening. In other cases the septal deviation may be associated only with deviation of the nasal tip. As a result of these anterior (caudal) septal displacements, there is often distortion of the alae nasi, whic

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Submitted for publication July 20, 1954.

adds to the cosmetic problem. The usual distortion of the nose when subluxation of the anterior septum is into the left nostril is a distorted columella displaced to the right, a right nostril smaller and a left nostril larger than normal, and a nasal tip that deviates from the midline, and vice versa.

There is also drooping of the nasal tip and obstruction to breathing. This type of deformity often occurs in children from falling on the face and the tip of the nose. Displacements of the septal cartilage may be among the deformities of the nasal bones and the lateral cartilages when the trauma is severe. A common deformity is deflection of the septum to the side of the associated curved dorsal hump formed by isplacement and overriding of the nasal ones and the upper and lower lateral cartilages. Palpation of the nasal dorsum and intranasal inspection and palpation will determine the shape and position of the deviated septal cartilages, nasal bones and upper and lower lateral cartilages.

The Metzenbaum Operation.—Various operative procedures have been developed to correct septal deviations and the nasal deformities frequently associated with them, on the principle of preservation of the normal support and contour of the nose. Many variations of a basic procedure have been devised since Metzenbaum[1] first described his operation for replacement of the lower end of the septal cartilage. He stated, "The cartilaginous septum is the main support of the soft tissues of the nose. The lower end of the cartilaginous septum is the sole support of the nasal tip except for the narrow strip of cartilage in the columella." He compared the deflected portion of the septum, in relation to the tip of the nose, to a partially open door in which the casing is not rigid and thus falls at the open end. The operation he proposed is as follows: An incision is made along the free edge of the dislocated septal cartilage and the mucous membrane is separated only along its anterior surface to the columella. The mucous membrane on the upper or posterior surface of the disclocated cartilage is not sepa-

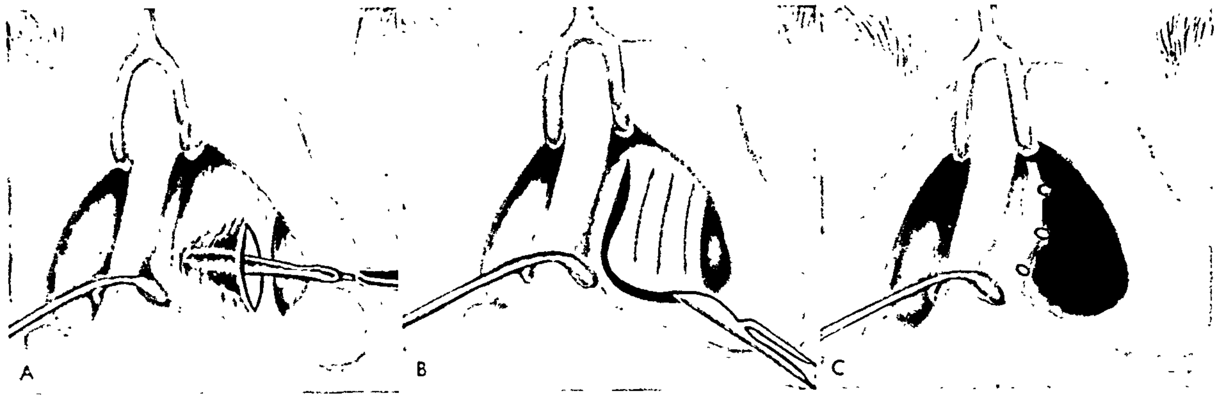


Fig. 1.—Method of repair of dislocated anterior septum (after Metzenbaum). *A*, diagram showing anterior septum dislocated into left nares. After incision along free border of dislocated cartilage, the mucous membrane on the lower segment is elevated anteriorly to and into the columellar cleft and above under the tip. The mucoperichondrium on the upper side of the dislocated cartilage is not separated from the cartilage. *B*, the elevated mucous membrane of the lower surface of cartilage shelf is retracted to expose the angle of deflection. Incision made through the angle of deflection of the cartilage, but not through the mucous membrane of the opposite nostril. Incision carried likewise along base. Cartilage shelf cross-hatched or longitudinal incisions through cartilage to take out the spring. The displaced cartilage now becomes a movable door that can be swung into the midline. *C*, the septal movable door (dislocated anterior septum) swung into midline into columellar pocket and held in place by approximation of original septal incision and intranasal packing.

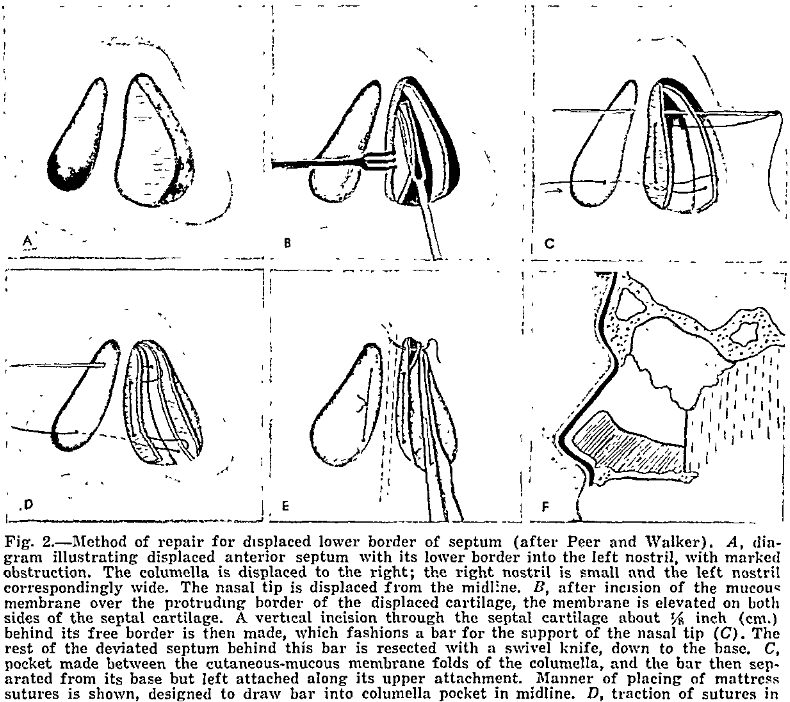


Fig. 2.—Method of repair for displaced lower border of septum (after Peer and Walker). *A*, diagram illustrating displaced anterior septum with its lower border into the left nostril, with marked obstruction. The columella is displaced to the right; the right nostril is small and the left nostril correspondingly wide. The nasal tip is displaced from the midline. *B*, after incision of the mucous membrane over the protruding border of the displaced cartilage, the membrane is elevated on both sides of the septal cartilage. A vertical incision through the septal cartilage about ⅛ inch (cm.) behind its free border is then made, which fashions a bar for the support of the nasal tip (*C*). The rest of the deviated septum behind this bar is resected with a swivel knife, down to the base. *C*, pocket made between the cutaneous-mucous membrane folds of the columella, and the bar then separated from its base but left attached along its upper attachment. Manner of placing of mattress sutures is shown, designed to draw bar into columella pocket in midline. *D*, traction of sutures in process. *E*, mattress sutures tied, holding bar in midline to support the nasal tip. Interrupted sutures then placed to unite original mucous membrane incision, thus adding support to the bar held between the columella pocket. *F*, diagram to show extent of removed septal cartilage with preservation of anterior bar.

rated from the cartilage. An incision is then made through the cartilage to but not through the opposite mucous membrane at the angle of deflection. It may be necessary to remove a narrow strip of cartilage parallel to the incision. It may be necessary also to continue this incision along the base of the dislocated cartilage, but not through the opposite mucous membrane, to make the swinging door thus created more mobile for replacement. Additional cross-hatching of the "door" may also be needed to take the spring out of the cartilage. It is important to note that the dislocated cartilage is left attached along its upper border. The tissues just back of the columella are separated for the reception of the dislocated cartilage, which is swung like a door into the columellar pocket, thus removing the obstruction and raising the tip of the nose to its normal position. T[illegible] ost [illegible], portion of the septum may then be removed, if necessary, by the usual submucous resection. It is important to make a satisfactory pocket into the columella and above to receive the dislocated cartilage in the corrected position.

Comment.—The Metzenbaum procedure was the first forward and definite step in the plastic repair of the anterior dislocated cartilage. The results in most cases are good when one is dealing with an anterior septal shelf dislocated into one nostril,

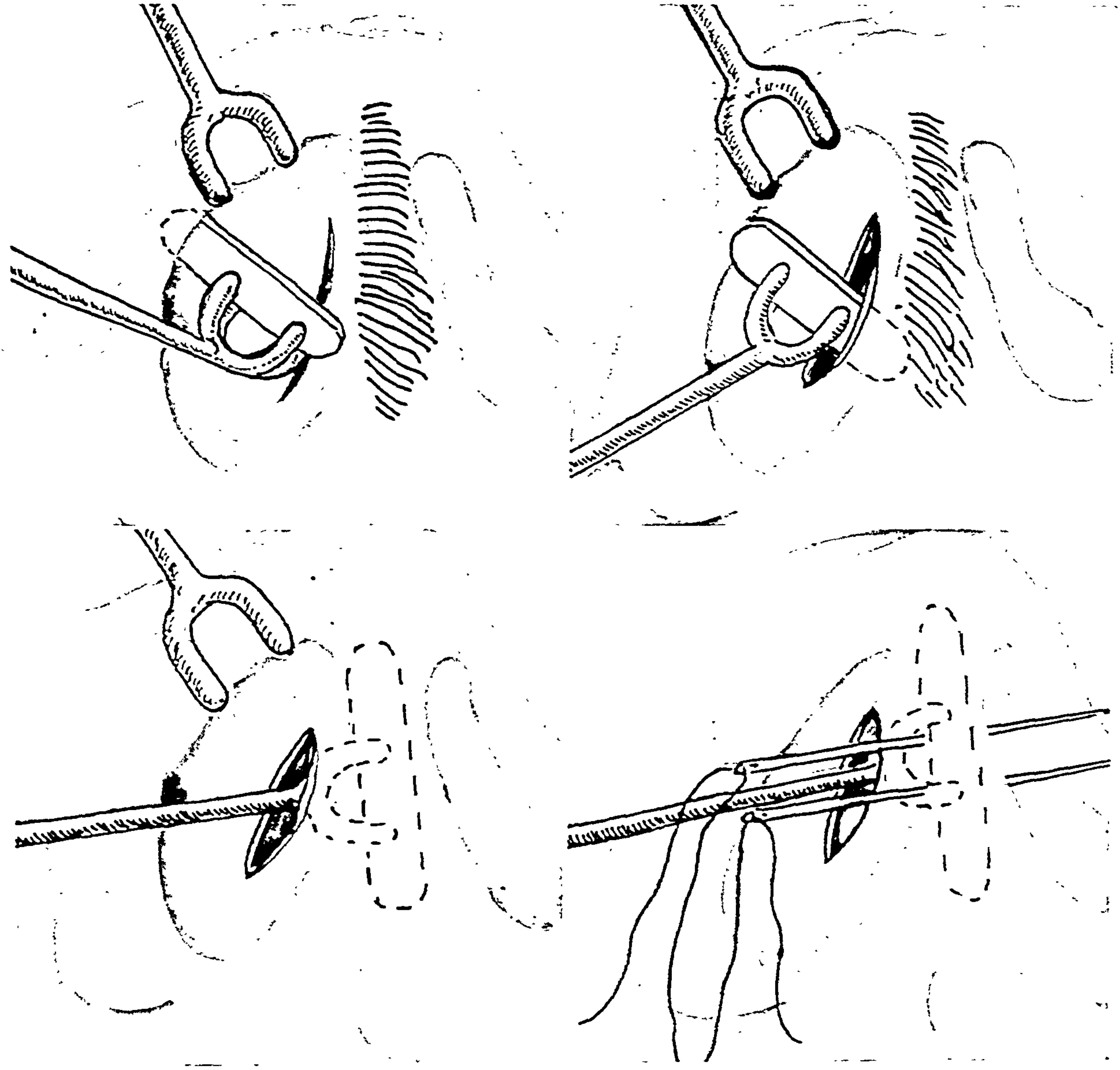


Fig. 3.—Diagram for columellar strut. *A*, *B* and *C*, complete removal of displaced (distorted) anterior septum, accomplished by submucous resection. Removed part discarded because it cannot be utilized in the plastic repair. Incision through the septal mucous membrane only on one side. Strut fashioned by submucous resection of septum above, or obtained from preserved cartilage. After pocket is made between folds of the columella through septal incision, strut is placed in columella pocket. *D*, manner of placing mattress suture behind strut to hold it in place. Septal incision closed by interrupted sutures.

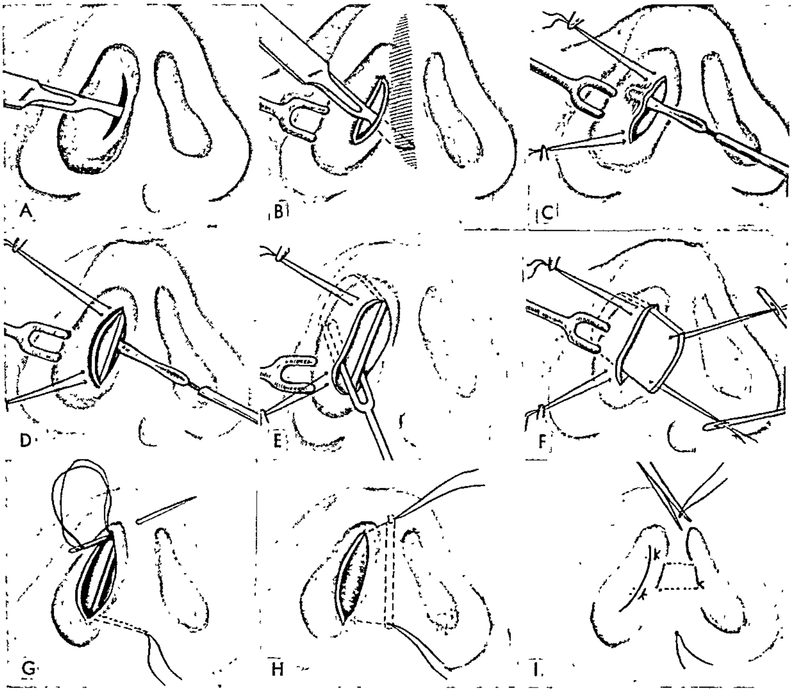


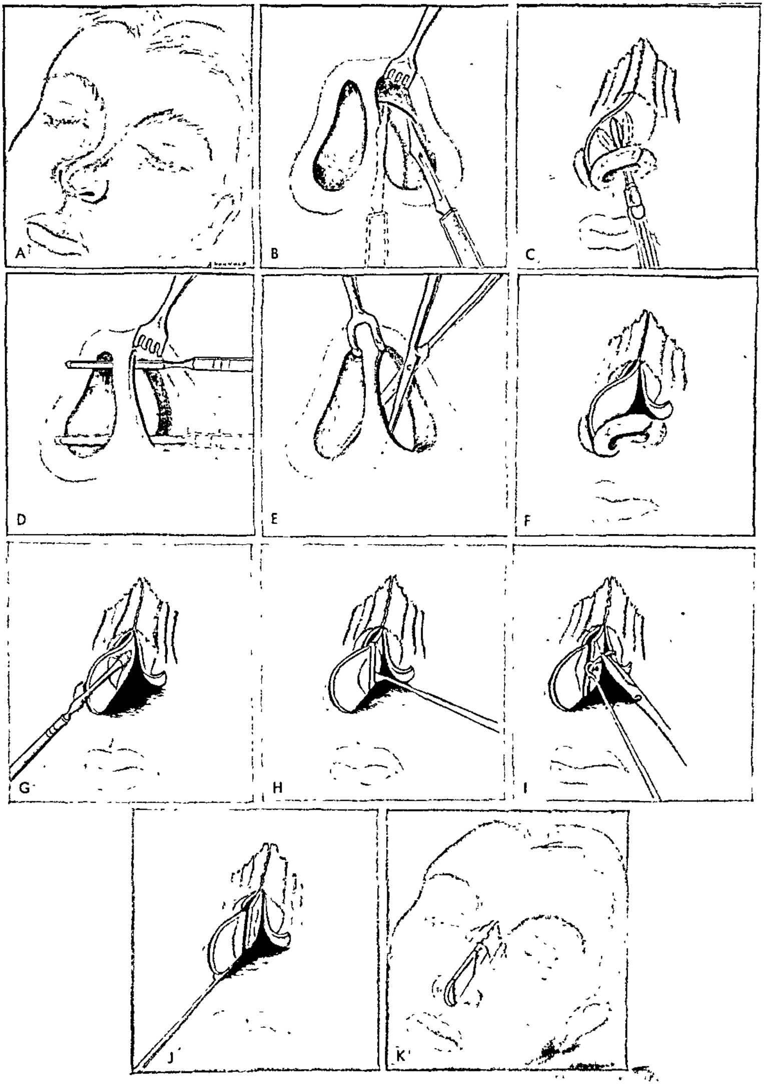
Fig. 4.—Diagram for making cartilage-plate graft to repair a displaced, distorted anterior septal cartilage, which must be discarded in the repair. *A*, septal incision; distorted anterior displacement removed and discarded by submucous resection. *B*, pocket made between folds of columella through septal incision to just beneath skin, and from tip to dorsum. *C*, submucous elevation of quadrilateral, undeviated septum on one side. *D*, submucous elevation continued on through opposite side of septum. *E*, removal of quadrilateral septum with swivel knife. *F*, placement of guide sutures on straight needle through upper and lower edges of the septal graft. *G*, placement of guide sutures through upper and lower angles of columellar pocket. *H*, septal graft in place. *I*, septal incision closed with interrupted sutures; mattress suture placed through septum to hold graft in place. Guide sutures removed.

accompanied by a soft and drooping nasal tip, but when there are additional factors of distortion other operative procedures must be instituted. Often the vomer is dislocated and also thickened, and therefore, after careful submucous dissection of the overlying mucous membrane must be refractured to the midline or removed. Correction of an alar or lateral cartilage with an associated twisted nasal tip must be approached through the intercartilaginous incision, with transection of the septum and the columella at the same time before they can be reshaped.

The Peer Procedure.—Another basic procedure for plastic repair of the dislocated anterior septal cartilage has been described by Peer and Walker.[2] In this operation an incision is made in the mucous membrane over the free border of the protruding dislocated shelf and the mucous membrane and perichondrium elevated on both sides of the columella. This makes the dislocated portion a free graft, which is then removed, except for a bar made by another incision 3 mm. behind the first one. A swivel knife removes the free subluxated cartilage except for this bar and a portion of the septum at the dorsum, which is continuous with the upright bar. The swivel knife cut may include any part, behind or below, down to the floor of the nose, depending on the requirements. A pocket is made between the cutaneous folds of the columella, and he upright bar is separated from the floor the nose. Specially placed sutures (see diagrams) replace the bar as a normal support of the columella and the tip of the nose.

When the anterior septum is so distorted or thickened that the aforementioned procedures cannot be utilized and the distorted segment must be removed and sacrificed, the following basic procedure described by Peer[2] may be used with gratifying results: An incision is made along the angle of deflection, and the entire thickened and distorted anterior segment is removed by submucous resection. Dissection is continued anteriorly into the columella between the two medial crura of the alar cartilages; this makes a pocket into which a cartilage graft (strut) is inserted to support and raise the tip of the nose. Such a graft may be obtained from the resected quadrilateral septal plate above the discarded portion, or it may be obtained from preserved septal cartilage plates from previous submucous resections or from preserved costochondral cartilage obtained from a fresh cadaver. Such cartilage is preserved in a solution of 1:1,000 aqueous merthiolate or 1:4,000 aqueous zephrin solution and stored in an ordinary refrigerator. The solution should be cultured for sterility from time to time to assure absence of contamination. The columellar graft serves as a strut or prop and is held in place by several mattress sutures through the columella behind the graft. Instead of such a strut, a septal cartilaginous plate from the quadrilateral cartilage may be resected (or a similar preserved cartilage plate may be used), shaped and brought anteriorly into the columellar pocket between the two opposing septal mucous flaps as described by Galloway.[3] This free isograft, or preserved graft, is drawn into position in the columellar pocket by two sutures, one directed ventrally and one dorsally, placed

Fig. 5 (*opposite*).—Plastic repair of deviated septum associated with a deflected tip (after Seltzer). *A*, showing twisted nasal contour due to marked nasal-septal deviation. *B*, beginning transection of the nose; intranasal incision between upper and lower lateral cartilages; repeated on opposite side. *C*, undermining of skin of nose over dorsum and sides by Joseph knife or scissors; repeated on other side, followed by transection of septum along dorsum from nasal bone to columella with button end knife. *D*, transection continued from tip of nose to base between caudal end of septum and subseptum. *E*, continued separation of tissues below caudal septum with scissors. *F*, diagramatic view of septum in full exposure after completion of the preceding steps. Upper lateral cartilages severed from septal attachment to facilitate exposure and manipulation. *G*, incision and elevation of septal mucoperichondrium after transfixation of nose. *H*, cutting of narrow parallel strip of cartilage from dorsum to base, just anterior to deflection angle. Incisions are made through cartilage only. *I*, removal of narrow strip of cartilage by means of goose-necked hook and forceps. Mucoperichondrium on opposite side is preserved. *J*, septum freed from base by posterior-anterior incision along nasal floor on the same side. Mucoperichondrium on opposite side is preserved. *K*, septal cartilage swung into midline and held together with interrupted sutures through mucoperichondrium where strip was removed; also anterior margin of caudal septum reattached by sutures to subseptum.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through the upper and lower end of the inserted cartilage plate and through corresponding points of the columella. It has been argued that the insertion of such a cartilage graft between the medial crura and to the columellar skin abnormally increases the width of the columella. This does not occur, however, unless the cartilage graft is unusually thick. It can also be avoided by first fixing the graft just behind the medial crura by mattress sutures or by removing the tissues between the medial crura of the columella. After closure of the septal incision and fixation of the septal graft by through-and-through mattress sutures, the guide sutures through the center of the columella are removed.

When a large portion of the quadrilateral cartilage is resected for the purpose of shifting it anteriorly, or when it must be discarded after resection because of its deformity, there are some important facts to be remembered. Since the lateral cartilages are fused in the midline to the septum and above to the nasal bones, they form together a resistant cartilage vault and maintain the normal contour of the external nose. Therefore, a rim of septal cartilage should always be left where the upper lateral cartilages fuse with the septum. When fusion is not preserved at this weakest part of the vault, there will ensue a sinking of the dorsum at this point. If the remaining rim of the septum still leaves the dorsum of the nose irregular, correction may be accomplished by cross-hatching the rim to take out its spring, and the corrected position maintained during healing by intranasal packing.

Any associated deformity of the lateral cartilages is corrected at the same time. It may be necessary to free the upper lateral cartilages from their overlying tissues and from the mucoperichondrium below, sever them from the septum and then reshape and replace them. The alar cartilages may also require reshaping because of distortion. These are attacked by the usual approach of the lobule.

Comment.—Isografts should be used instead of preserved cartilage whenever possible, as there is practically no reaction, no absorption of the isograft and no question of a "take." Preserved cartilage produces cellular reaction to some degree, and there is some absorption after a time. It is interesting to note that Peer[5] observed that septal bone grafts without periosteum survive in abdominal pockets for periods up to four years after transplantation, whereas rib and tibial bone grafts disappear in several months.

Seltzer[6] has well illustrated the principle of repair of the deviated septum associated with deflection of the nasal tip, and may be followed when there is no need to remove in toto a badly distorted septal plate or a thickened anterior septal segment as aforedescribed. The technic is as follows: An internasal-interlateral cartilage incision is made on each side to the septum, through which the overlying skin and subcutaneous tissues are separated over the dorsum to the tip of the nose. A button knife is then introduced through this intercartilaginous incision and advanced to the nasofrontal sutures and under the periosteum of the nasal bone. The knife is then swept down across the upper edge of the septum to the caudal end and then turned at a right angle and continued down and through the membranous septum. The latter incision is enlarged with a scissors to the nasal spine. "At this point the septum can be pushed to one side and into full view. The operation on the septum itself is done by incising the mucoperichondrium on the convex side, anterior to but near the line of delection. Through this incision the mucoperichondrium is elevated to the buckle of the deflection." A strip of cartilage measuring 0.1 to 0.5 cm. is then removed just anterior to the line of deflection, to but not through the opposite mucous membrane. The base of the septum is then freed by an anterior posterior incision along the nasal floor, through the cartilage on the operative side to but not through the opposite mucoperichondrium. In this manner the anterior segment becomes freely movable like a door and can be replaced in a central position. The opposing surfaces between the vertical removed strips of septal cartilage are approximated by two sutures. An Asch tube with carbowax gauze impregnated with 10 per cent sulfathiazole and 2 per cent kephrin-hydrochloride or other antibiotic ointment is inserted into each nostril to check bleeding, create a bacteriostatic film, provide drainage and ventilation, and hold the septum firmly in position, as well as to give support to the constricted tip. On the side of the septal convexity a somewhat larger Asch tube is used to secure pressure on the septum. The tubes are left in place for four days. The alar and lateral cartilages may then be exposed and reshaped and the suseptal incision closed.

Steffenson[7] describes a modification of this procedure for repair of a deflected anterior nasal septum. An incision is made at the mucocutaneous juncture on the side of the dislocated anterior septal cartilage, to expose the cartilage. Through this incision the mucoperichondrium is elevated on the convex side of the septal deformity, even though the first incision is made on the opposite side. Elevation is continued upward and back until the elevator can be seen through the skin along the dorsum, from the nasal bones to the tip and inferiorly along the base and over the vomer as far as is necessary. Posteriorly the dissection extends to the angle of deflection. The opposite mucoperichondrium is left intact. A No. 15 Bard-Parker or angled knife is then introduced to the angle of deflection, and an incision is made to but not through the opposite mucoperichondrium, from the dorsum to the base. If the angle of deflection is sharp a vertical strip of septal cartilage, similar to that employed in the Seltzer procedure,[6] is removed. Another incision is made along the base, and a section of septal cartilage is removed next to the base if the ultimate normal placement of the septal cartilage necessitates it. Any deflection of the septum posterior to the vertical septal incisions may be removed as necessary by submucous resection. The vomer is then fractured with a suitable forceps and rotated to the midline, since it is often distorted. This can be accomplished by elevating the periosteum of the vomer on the convex side. The now freely movable edge of the anterior subluxated cartilage is then fitted into a pocket made in the columella for its reception, and the primary mucocutaneous incision is closed. The nose is lightly packed for twenty-four to forty-eight hours, and the sutures are removed in seven to ten days. The reshaping of the deformed nasal bones and lateral and alar cartilages may be done at the same time. I correct the septum first when the combined procedures are indicated.

In these operations on the septum and vomer, it sometimes occurs that there remains a defect of the mucosa and perichondrium at the base on the side of operation. This raw area may be replaced by a free mucous membrane graft or a composite graft of cartilage and mucosa. Cartilage with attached mucous membrane on one side may be obtained from the anterior septum, when the latter is shortened, or a mucous membrane graft alone may be procured from under the middle turbinate of the unoperated side, or from the buccal mucosa. These grafts take rapidly and are secure by the seventh postoperative day.

Comment.—It is apparent that the procedures of Seltzer and Steffenson on the anterior septum cannot be utilized when there is the necessity of sacrificing a greatly distorted or thickened anterior segment of the septum. In these cases a free graft must replace the removed portion in order to reestablish normal contour and support of the nasal tip. There is also the question whether it is feasible to mobilize and straighten the septum, resect a hump and reshape the alar and lateral cartilages at the same time. Since resection of a dorsal hump usually includes removal of the upper portion of the septum as well, a complete septal resection for septal deformity should not be undertaken at the same time in order to preserve septal support to the dorsum. It has been my custom first to resect the hump, infract the nasal bones and shorten the nose at the first operation. Whatever operation is performed on the deflected septum is done without diminishing the support of the dorsum, especially where the lateral cartilages fuse with the septum. At a second operation the deviated septum and deformed lateral cartilages are corrected. A combined operation, however, may be possible when the septal distortion does not encroach on the dorsal cleavage. The choice of a procedure and its success in the correction of these deformities necessarily depend on careful analysis of the deformity, as well as on the experience and aesthetic perceptions of the surgeon.

SUMMARY

Evaluation of the basic plastic procedures for repair of the distorted anterior septal cartilage are described. The selection of a procedure depends upon analysis of the type and extent of the septal deformity, the type and extent of any associated deformity of the lateral and alar cartilages and type and extent of any associated deformity of the nasal bones.

RIASSUNTO

Vengono descritti i metodi di plastica della cartilagine nasale anteriore. La scelta dipende dalla gravità e dal tipo di anomalia del setto, delle cartilagini laterali e alari e dalle ossa nasali.

RÉSUMÉ

Description des techniques plastiques pour la réparation du cartilage du septum nasal antérieur dévié. Le choix du procédé dépend de l'analyse du type et de l'importance de la déformation de la paroi du septum, du type, de l'importance de toute déformation secondaire des cartilages latéraux, de l'aile du nez, et de l'importance de toute déformation secondaire des os du nez.

SUMARIO

São descritos processos plásticos para reparo de deformação da cartilagem septal anterior. A escolha do processo depende do tipo e da extensão da deformidade septal, do tipo e da extensão de alguma deformidade associada das cartilagens lateral e alar e do tipo e da extensão de outra deformidade concomitante dos ossos nasais.

ZUSAMMENFASSUNG

Die grundlegenden zur Wiederherstellung deformierter vorderer Septumknorpel angewandten plastischen Verfahren werden beschrieben und auf ihren Wert hin geprüft. Die Auswahl eines Verfahrens beruht auf der Untersuchung der Form und Ausdehnung der Septumdeformierung, einhergehender Entstellungen der Seitenknorpel und der Nasenflügelknorpel sowie etwaiger Beteiligung des Nasenbeins.

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6. Seltzer, A. P.: The Nasal Septum; Plastic Repair of the Deviated Septum Associated with a Deflected Tip, Arch. Otolaryngol. 41:433-444 (Dec.) 1944.

7. Steffensen, W. H.: Reconstruction of the Nasal Septum, Plast. & Reconstruct. Surg. 2:66-71 (Jan.) 1947.

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If there be a thousand millions of men on the earth, that is much; that gives about five hundred millions of women, who sew, spin, nourish their little ones, keep their houses or cabins in order, and slander their neighbors a little. I see not what great harm these poor innocents do on earth. Of this number of inhabitants of the globe there are at least two hundred millions of children, who certainly neither kill nor steal, and about as many old people and invalids who have not the power of doing so. There will remain at most an hundred millions of robust young people capable of crime. Of this hundred millions there are ninety continually occupied in forcing the earth, by prodigious labor, to furnish them with food and clothing; these have scarcely time. In the ten remaining millions will be comprised idle people and good company, who would enjoy themselves at their ease; men of talent occupied in their professions; magistrates, priests, visibly interested in leading a pure life, at least in appearance . . . There is therefore infinitely less wickedness on the earth than we are told and believe there is. There is still too much no doubt; we see misfortunes and horrible crimes; but the pleasure of complaining of and exaggerating them is so great, that at the least scratch we say that the earth flows with blood . . . A melancholy mind which has suffered injustice, sees the earth covered with damned people; as a young rake, supping with his lady, on coming from the opera, imagines that there are no misfortunes.

—*Voltaire*

Editorial

AMA Journal Salutes the Hall of Fame

IN the Journal of the American Medical Association for Dec. 25, 1954, the following editorial was published in appreciation of the founding of the International Surgeons' Hall of Fame in Chicago by the International College of Surgeons:

"A new institution is developing on Chicago's near north side that will be of great interest to the medical profession throughout the world. It is the International Surgeons' Hall of Fame and Museum of Surgical Science. This unique organization was conceived to recognize the contributions of surgeons to freedom from suffering, to the prolongation of life, and to the progress of mankind. While it was dedicated only last September at a ceremony attended by representatives from many countries, rapid progress has been made in remodeling the attractive building and in the installation of the priceless exhibits. The idea and the hope for a surgeon's shrine and museum originated years ago with Dr. Max Thorek, founder of the International College of Surgeons, but not until 1953 did the trustees of the college act to establish the memorial. A mansion adjoining the headquarters of the college was purchased, and architects were promptly commissioned to supervise the necessary remodeling. In September of 1953, an international committee on arrangements was appointed, with Dr. Rudolf Nissen of Switzerland and Dr. Morris Fishbein of Chicago as co-chairmen. By March a distinguished Italian painter had finished sketches for the mural room depicting the development of surgical science throughout the ages, and many of the murals have now been completed. Sculptors from the Chicago Art Institute were commissioned to create life-sized figures of the immortals who will occupy the room by that name, and one of these statues has already been installed. The 12 were selected by an international committee of surgeons and medical historians. They are Imhotep, Hippocrates, Galen, Ambroise Paré, Vesalius, William Harvey, Giovanni Battista Morgagni, Ignaz Philipp Semmelweis, Louis Pasteur, Joseph Lister, Wilhelm von Roentgen, and Marie Curie.

"Many countries or groups of countries have been assigned their own rooms in the Hall of Fame, and among the rooms already furnished or partly so are those of Argentina, Austria, Brazil, British Commonwealth, China, Colombia, Egypt, France, Greece, Haiti, India, Israel, Italy, Japan, Mexico, Netherlands, Peru, Scandinavia, Switzerland, Turkey, United States, Venezuela. Others will be added shortly. The few exceptional treasures on display that can be mentioned here include the original postmortem report on the body of President Lincoln, the original mask used in administering the first anesthetic, 50 letters of Florence Nightingale, and the original model of the Carrel-Lindbergh artificial heart, which was installed in the Hall of Fame by General Lindbergh himself. Another room is the Hall of Manuscripts, which has been enriched by Dr. Thorek's own collection of scientific papers, the massing of which has been a hobby of his for many years. These will be greatly augmented by other persons and institutions interested in medical history.

"A significant idea yet to be realized is the remodeling of the building in the rear of the Hall of Fame into an amphitheater where series of lectures by eminent speakers will be presented periodically to medical students, physicians, and the public. On the lawn along Lake Shore Drive will be erected a life-sized statue symbolizing the surgeon rendering aid to a stricken patient.

"While a memorial so extensive and far reaching cannot be wholly achieved in a day, the cooperation and support already given by many nations and individuals strongly indicate a genuine desire and need for continued progress. Last September 9 at the dedication banquet delegates from 25 countries were present.

"The International Surgeons' Hall of Fame will be controlled by an electoral college of about 150 members and by the international officers of the International College of Surgeons. The college of electors will include one from each section of the International College of Surgeons and one from each nation in which no section exists chosen by the surgical organizations of such nations. Nominations for the Hall of Fame are not restricted to member nations. The electoral college will consider the merits of any nominee suggested by any surgeon in the world; however, no name will be recognized for this distinction except that of a person who has been deceased for at least 15 years.

"And so, as others have said of this memorial, 'We are but paying another installment of our agelong debt to those who cleared the way for us, a debt to which we can never write *Paid in Full.* Without the heritage of knowledge and skill bequeathed us by the genius of the past, the genius of the future would be but a flickering torch.' "

We are happy to acknowledge this honor and courtesy in the pages of our own Journal, and to express our own warm appreciation of this further evidence of the widespread acclaim that has greeted the Hall of Fame from its inception. We are deeply conscious of our responsibility to the surgeons of the free world and, needless to say, will do our utmost to insure that the Hall of Fame will be and remain worthy in every way of the great figures in surgical history there enshrined.

M. T.

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We make for ourselves, in truth, our own spiritual world monsters, chimeras, angels, we make objective what ferments in us. All is marvelous for the poet; all is divine for the saint; all is great for the hero; all is wretched, miserable, ugly, and bad for the base and sordid soul. The bad man creates around him a pandemonium, the artist an Olympus, the elect a soul, a paradise, which each of them sees for himself alone.

—*Amiel*

New Books

Urology. Edited by Meredith Campbell, with the collaboration of 51 contributing authors. In 3 volumes, with illustrations. Philadelphia: The W. B. Saunders Company, 1940.

These three volumes, constituting 2,356 pages, are somewhat encyclopedic. The work presents a thorough review of the subject. The fundamental science, such as physiology, biochemistry, neurology and endocrinology are included.

Dr. Campbell states that the subject has grown to such herculean proportions that no one person is qualified to present all phases of the subject. He has acquired outstanding collaborators who are known not only for their practical work but for their investigative approach.

The work is voluminously documented, with numerous drawings, roentgenograms and photographs.

It was particularly gratifying to this reviewer to note that surgical anatomy was given its rightful preeminence. It is unfortunate that anatomy has been considered relatively unimportant in many recent works.

For particular commendation must be mentioned Section 4, which deals with embryology and anamolies of the urogenital tract, Section 9 on injuries of the urogenital tract and Chapters 1 and 2 of Section 15, in which urologic surgery is discussed.

These volumes can be recommended wholeheartedly to anyone interested in urology. The book should find its way into numerous libraries and hospitals as a reference work for the general practitioner who must have ready access to an authoritative presentation.

PHILIP THOREK, M.D.

A History of Medicine. In 2 volumes. By Ralph H. Major. Springfield, Ill.: Charles C Thomas, Publisher, 1954.

At this time, when the medical profession is being criticized from within and without, there appears this excellent book on the history of medicine. It is a timely reminder that "despite attacks and abuse, despite quacks and charlatans, and in spite of its own mistakes, it (the profession) has proved itself more enduring than any of the civilizations which gave birth to it."

Dr. Major has been successful in presenting an interesting account of the progress of medicine and the men who were leaders in that progress. He has accomplished this by devoting the bulk of the book to the "flow" of medicine itself. At the end of each chapter there are biographical addenda in which further data concerning the men discussed may be found.

The two-volume book is well documented with illustrations and photographs. It is printed on good stock, and the reproductions are excellent. Anyone interested in the history of medicine will find it a pleasant fount of information. It can be recommended for both students and clinicians.

PHILIP THOREK, M.D.

The Pyramidal Tract: Its Status in Medicine. By A. M. Lassek. Springfield, Ill.: Charles C Thomas, Publisher, 1954. American Lecture Series. Pp. 166. No illustrations.

This well organized little volume represents essentially a competent bibliographic review of the theories as well as the anatomic, physiologic and clinical observations concerning the pyramidal tract, that important part of the central nervous system. There are 299 references to the pertinent literature, 33 of which deal with contributions by the author and his co-workers. The author is head of the department of Anatomy at Boston University School of Medicine. One might find it strange, perhaps, that a study by an anatomist should be devoid of illustrations; actually, they will hardly be missed by the specialist-reader, since the descriptions are clear and adequate throughout.

The main chapters deal with gross observations (1710-1870), histologic studies, secondary and retrograde degeneration, results of electrical stimulation, signs and symptoms, surgical operations involving the pyramidal tract, results of animal experimentation and the status of the tract in medicine. The strong historical interests of the author are obvious throughout, and he has skillfully abstracted numerous classic, old and modern concepts. The basic investigations in man and the observations in animal experimentation are outlined in two final chapters, in which the major theories and results of research are tabulated in chronologic order.

In a very interesting chapter the author also considers the afferent system, which offers an opportunity to emphasize the importance of afferent impulses in all aspects of voluntary motor physiologic function. The author appears to agree with the modern concept that the pyramidal tract represents a system of internuncial neurons, intercalated between the cortical sensory areas of conscious registration and the lower motor neurons. The question whether spastic paralysis is the direct result of lesions in the pyramidal tract and the capricious nature of Babinski's sign are discussed in several chapters. The author points to the scant evidence for the view that paralysis is due to destruction of the neurons of the pyramidal tract. "There is mounting evidence that the so-called pyramidal syndrome can occur in man in the absence of any observable signs of degeneration in its neurons." Animal experimentation in primates would indicate that the collective dorsal root system plays an important dynamic role in motor behavior. When all the dorsal roots of the nerves to an extremity are severed, "it produces a more severe and enduring paralysis than when the motor cortex is extirpated."

The problems of restitution of function after paralysis likewise are discussed. Anatomically, the pyramidal tract consists predominantly of fibers of small caliber. This suggests slow conductivity. Only the relatively few large fibers propagate impulses at maximal velocity. The large Betz cells in cortical area 4 cannot be the sole origin of pyramidal axons; locations of "upper motor neurons," most likely, also occur in the premotor and parietal cortical areas.

The clear style and good printing make for easy, stimulating reading. There is a good index.

ARNOLD A. ZIMMERMANN, D.Sc.

A Manual on Cardiac Resuscitation. By Robert M. Hosler. Springfield, Ill.: Charles C Thomas, Publisher, 1954. Pp. 183. Illustrated.

The gist of this pocket-sized manual is a step-by-step procedure for the emergency of cardiac arrest on the operating table. The technics were developed by Beck, Rand and Hosler for their course in cardiac resuscitation, and have been taught in Cleveland, Ohio, since 1950. By 1952, 20 successful resuscitations had been reported by graduates of this course.

In this procedure, which coordinates the action of the anesthetist and the surgeon, the first and basic part is the emergency act that reestablishes an adequate oxygen supply by intratracheal intubation and cardiac massage. The second part is the restoration of the normal heartbeat by massage, restoratives and electric shock. Since these measures must be applied within five minutes after stoppage of the heart, the surgeon must be prearmed with a familiar plan and ready to attack almost automatically. The necessary equipment must also be routinely on hand.

A special virtue of this presentation is the emphasis on time-consuming and wasteful steps that can be avoided. Although the practical procedure is all important, the book also supplies an adequate theoretical background in chapters on the cardiac mechanism, the historical and etiologic aspects of cardiac arrest, prevention, postoperative measures, results and legal aspects. A chapter on danger signals for the anesthetist has been added by R. J. Whitacre. There are well selected bibliographies, and photographs of equipment and the technic of massage are included.

Every surgeon owes it to himself to review this procedure; none will do so without profit. It will be a vital contribution to classes elsewhere that follow the Cleveland model.

M. T.

The Bacterial Factor in Traumatic Shock. By Jacob Fine. Springfield, Ill.: Charles C Thomas, Publisher, 1954. Pp. 83.

This brief monograph presents the opinions of the author on the cause of traumatic shock. A publication of this type is, of course, highly controversial, but it is not the purpose of the reviewer to contradict statements made by the author.

The author explains and "proves" his theory on the basis of excellent animal experiments. As long as knowledge on the subject of shock is still rather limited, a monograph of this type presenting one theory is important. The book will be of great interest to anybody interested in research.

WERNER F. EISENSTAEDT, M.D.

Proceedings of the Fourth International Congress of the International Society of Hematology, Mar del Plata, Argentina, Sept. 20-27, 1952. Edited by F. Jimenez de Asua, W. Dameshek and S. Haberman. New York: Grune and Stratton, 1954. Pp. 473.

This book represents a collection of papers presented at the Fourth International Congress of the International Society of Hematology. The principal ones are reproduced in full; others are in abstract form. All papers are presented in English and Spanish.

The book is an interesting historical document on the state of hematology in 1952. Considering the progress made in hematologic research, some of the papers are, of course, outdated at the time of publication.

The important papers, however, are fundamentally significant to the current knowledge of hematology. Future publications might be improved by the addition of brief résumés of the discussions and the symposiums.

The publisher is to be congratulated on the magnificent reproduction of color plates and halftone illustrations. The book is a valuable addition to the library of anyone interested in hematologic research.

WERNER F. EISENSTAEDT, M.D.

Neck Dissections. By James Barrett Brown and Frank McDowell. Springfield, Ill.: Charles C Thomas, Publisher, 1954.

The authors present a monograph of approximately 150 pages, devoted to the technic of neck dissection.

Emphasis is placed on extensive removal of the tissues most commonly invaded in the extension of carcinoma of the head and neck.

A number of photographs and many drawings illustrate their technics. The book is well written and the steps of each operation are set forth in a clear and concise manner.

The book would be a valuable addition to the library of any surgeon who performs any considerable number of operations on the neck.

RAYMOND W. MCNEALY, M.D.

Practical Fluid Therapy in Pediatrics. By Fontaine S. Hill. Philadelphia: The W. B. Saunders Company, 1954. Pp. 275.

The book on practical fluid therapy in pediatrics is remarkable for the conciseness, brevity and clear outline of indications and therapy.

In the first five chapters the author surveys physiological principles and their clinical significance. These chapters are written so clearly and simply that the reader acquires a full understanding of the subject.

Chapters 6 to 15 describe different disease entities, with their clinical manifestations, laboratory data and treatment. Each is summarized. The last two chapters are reserved for technical procedures.

All in all, the book is not only a "must" for pediatricians but is highly recommended for pathologists, surgeons and general practitioners. Anybody who reads it will certainly find that the cloud of mystery which has been hanging over the subject of fluid and electrolyte metabolism has disappeared.

WERNER F. EISENSTAEDT, M.D.

Books Received

The following books were received by the editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of any book.

Anatomy of the Human Body. By Henry Gray. Ed. by Charles Mayo Goss. 26th ed. Philadelphia, Lea & Febiger, 1954. Pp. 1480. 1202 illus., mostly in color.

Legal Medicine, Pathology and Toxicology. By Thomas A. Gonzales, Morgan Vance, Milton Helpern, and Charles J. Umberger. 2nd ed. New York, Appleton-Century-Crofts, Inc., 1954. Pp. 1349. Profusely illustrated.

Michael Servetus, Humanist and Martyr. By John F. Fulton. With a bibliography of his works and census of known copies by Madeline E. Stanton. New York, Herbert Reichner, 1953. Pp. 98. Facsimiles.

Les Vomissements du Nourisson: Etude *critique, Diagnostic étiologique, Indications* thérapeutiques. Par Emilio Roviralta. Edition revue et augmentée par l'auteur en 1952. Adaptation française de Bernard Duhamel, d'après la traduction de Edouard Del Castillo Jaquolot. Paris, Èditions Médicales Flammarion, 1952. Pp. 236. Illus.

Technique de la Chirurgie du Sympathique et de ses Infiltrations. Par O. Lambret, P. Razemon, et P. Decoulx. 4e éd. Paris, G. Doin & Cie., 1953. 115 figures et 4 planches.

Cystites Invétérées et Algies Pelviennes, leur Traitement par Infiltrations Anesthésiques et Neurotomies Chirurgicales. Par Raymond Darget et Rolland Ballanger. Paris, Masson & Cie., 1954. Pp. 118. Illus.

El Dranaje en Cirugía. Por Domingo Prat. Montevideo, Imprenta Rosgal, 1954. Pp. 166. Illus.

Aspectos Quirurgicos de la Estasis Biliar. Por J. Pi-Figueras, con V. Artigas y A. Llauradó. Madrid, Asociación Española de Cirujanos, n.d. Pp. 155. Illus. (III Congreso Nacional de Cirugía, Granada, Septiembre de 1953).

La Aortografía Abdominal. Por Ramon Carillo, Raul F. Matera, y Juan de Dulácska. Buenos Aires, Lopez & Etchogoyen, S.R.L., 1954. Pp. 114. Illus.

Sindromi Dolorose dopo Interventi Gastrici e loro Terapia Chirurgica. Per Luigi Leopoldo Bracco. Torino, Minerva Medica, 1952. Pp. 178. Plates.

Thorakoskopische Eingriffe am Nervensystem. Von E. Kux. Stuttgart, Georg Thieme, 1954. Pp. 130. 48 Teils mehrfarbigen Abbildungen.

Pratique de L'intubation intra-trachéale en Anesthésie. Par Henri Gibert. Paris, G. Doin & Cie., 1953. Pp. 188. 39 figures.

Pheochromocytoma and the General Practitioner. By Joseph L. DeCourcy and Cornelius B. DeCourcy. Cincinnati, DeCourcy Clinic, 1952. Pp. 165.

The Year Book of Obstetrics and Gynecology, 1954-1955. Ed. by J. P. Greenhill. Chicago, Year Book Publishers, 1954. Pp. 544. Abstracts.

Anuario Bibliografico Peruano de 1949-1950. Ed. by Alberto Tauro. Lima, Biblioteca Nacional, 1954. Pp. 427. (Ediciones de la Biblioteca Nacional-IX).

A general bibliography. I. Books and pamphlets. II. Periodicals. III. Bio-bibliographies. IV. Bib. of librarianship. Fully indexed, with cumulative contents of the series.

Part I Contains a section on medical sciences.

Hugh Roy Cullen, a story of American Opportunity. By Ed Kilman and Theon Wright. New York, Prentice-Hall, 1954. Pp. 376. Illus. Biography of a distinguished medical benefactor.

Diseases of the Skin, for Practitioners and Students. By George Clinton Andrews. 4th ed. Phil. and London, W. B. Saunders Co., 1954. Pp. 877. 777 illus.

La Valvola Mitrale: Aspetti anatomici, fisiologici, clinici e chirurgici. Per Michele A. Chiechi e Charles P. Bailey (sic). Roma, Pensiero Scientifico Ed., 1954. Pp. 561. Illus.

The History of the Samaritan Free Hospital, with an Appendix on the London Hospitals and Infirmaries. By Arnold Whitaker Oxford. Cambridge, W. Heffer & Sons, Ltd., 1931. Pp. 96.

Patología del Estomago Operado: II Congreso Argentino de Gastroentoerología, Mar del Plata, 13-18 de Abril de 1953. Contributors from Sociedad de Gastroenterología de Buenos Aires, Asociación Argentina de Radiología, and Sociedad Médica de Mendoza. Buenos Aires, Ed. Universitaria, 1954. Pp. 482. Illus.

Verhandlungen der Deutschen Gesellschaft für Chirurgie, 70 Tagung, 7-11 April 1953. Berlin, Springer Verlag, 1953. Pp. 768. Illus. (Langenbecks Archiv für Klinische Chirurgie, Band 276.)

The Antiseptic (Madras), Golden Jubilee Number, April, 1954. Pp. 233-732.

Harofe Haivri, the Hebrew Medical Journal(New York), Vol. I, 1954. Pp. 256.

The Human Brain in Sagittal Section. By Marcus Singer and Paul I. Yakovlev. Springfield (Ill.), Chas. C Thomas, 1954. Pp. 81.

Standard Values in Nutrition and Metabolism. By Everett C. Albritten. Phil. & London, W. B. Saunders Co., 1954. Pp. 380. Tables.

V. Mesenterica Superior. Contribução Anatömica às Anastomoses Cirúrgicas como Sistema Cava Inferior. By Salomãv Kelner. Recife (Brasil), 1953. Pp. 131. Charts, tables.

Pathogenesis of Cancer. By John E. Gregory. 2nd ed. Pasadena, Fremont Foundation, 1952. Pp. 202. Illus.

Pediatric Diagnosis. By Morris Green and Julius B. Richmond. Phil. and [illegible], W. B. Saunders Co., 1954. Pp. 43

Abstracts from Current Literature

Benign Esophagus Strictures Caused by Reflux Esophagitis in Cases of Duodenal Ulcer. Rudstrom, P., Acta Chir. Scand. **107:** 404, 1954.

Rudstrom reports on 6 patients with reflux esophagitis of the lower portion of the esophagus, followed by benign esophageal stenosis, in whom the primary lesion was a duodenal ulcer associated with gastric hyperacidity. Obviously the cardiac sphincteric action, which should prevent a reflux, was defective. Often the esophageal stenosis is so extensive and complete that a detailed barium study of the stomach and duodenum is impossible, and the author explains that this is why, in so many cases of esophageal stenosis, the presence of a duodenal ulcer is never suspected. He performed exploratory thoracotomy on all patients but is now convinced that this is unnecessary if the patients go to a physician or surgeon instead of having their esophageal strictures dilated by an ear-nose-and-throat specialist. The esophageal stricture in these cases, he states, is a secondary lesion, not a primary one. Treatment of the ulcer is of primary concern.

He finds vagotomy less efficacious than subtotal gastrectomy, since in the former operation the gastric contents are not readily emptied, and this may prevent alleviation of the dysphagia.

Hiatal hernia must be ruled out in all these cases. (Excision of lower end of esophagus, for some pathologic process, followed by esophagogastrostomy, is often followed by postoperative reflex esophagitis due to destruction of the cardiac sphincter, and to prevent the intense burning pain localized deep to the lower border of the sternum, especially at night, the patient often has to sleep in the semi-Fowler position).

RICHARD A. LEONARDO, M.D.

Motorized Intermittent Traction for Treatment of Herniated Cervical Disk. Shenkin, H. A., J. A. M. A. 136:1967, 1954.

The author statistically reports the results of motorized intermittent traction in a series of 27 patients with pain in the neck, neck and shoulder or neck and arm resulting from cervical nerve root pressure. In this series the conventional methods of conservative treatment had failed.

The history with regard to trauma and repeated episodes, as well as the clinical observations, is discussed. The author points out the roentgenologic data on loss of intervertebral discs and loss or reversal of cervical lordosis; in his opinion, the latter may often be a cause of the referred pain. He also correlates clinical improvement with restoration of the normal curve. These observations are illustrated.

The apparatus, developed by Dr. Bernard Judovitch, is described and illustrated. It is a motorized traction apparatus that can be applied intermittently in variations up to 50 pounds of weight.

The author states that the 27 patients would ordinarily have been considered "surgical patients," because of the severity and duration of the condition and the failure of conservative treatment.

Of the 27 patients treated in the manner described, 16 recovered and 6 were improved. The remaining 5 required surgical intervention. The minimal follow-up was five and one-half months, and the longest two and one-half years.

PAUL W. SHANNON, M.D.

Portal Hypertension. Phadke, G. M., Indian J. Surg. 16:118 (June) 1954.

Portal hypertension related to cirrhosis of the liver is a variable condition. This is due to the amount of scar tissue produced, the pressure changes in the portal vein and hepatic artery, and the development of collaterals.

The author reviews 29 cases of advanced cirrhosis of the liver observed in Bombay, India. All the patients had ascites, peripheral edema and splenomegaly, with or without bleeding esophageal varices. Eighteen were treated surgically and 11 medically. There were no patients with extrahepatic block.

The rationale of the various operations recommended for the management of portal hypertension is critically reviewed. In India there were few candidates for shunt operations, since the cirrhosis was far advanced. In the author's opinion, an Eck fistula is inadvisable in cases of intrahepatic portal block, because protein metabolism is further impaired by the diversion of portal blood from the liver. In cases of extrahepatic obstruction it is the procedure of choice.

Splenectomy should not be done to lessen the load on the portal bed, because the splenic vein is sacrificed.

Ligations of the hepatic and splenic arteries are favored in all cases of portal cirrhosis in which there is no evidence of coma or gastrointestinal bleeding. Ascites and poor liver function are not contraindications. This operation is recommended after intensive medical treatment for six to eight weeks and after the patient's condition appears stabilized.

An attempt is made to perform the operation with intercostal block or epidural anesthesia, supplemented with cyclopropane in prolonged cases, to avoid hepatic anoxia. The surgical approach to the hepatic and splenic arteries is through the gastrocolic ligament. The edematous posterior peritoneum along the upper border of the pancreas should be incised to facilitate palpation of the celiac axis. If varices have been demonstrated on the roentgen films, the left gastric artery should also be ligated.

Eighteen patients were subjected to this procedure. Ten were improved and 2 were not. Six patients died within two months after the operation. Four of the 6 who died had hematemesis. Although the series is small and the follow-up is not reported, the author is convinced that the results are encouraging and should improve in cases of the disease in the early stages.

MORRIS T. PARKER, M.D.

Reflections on Regional Ileitis, Twenty Years Later. Crohn, B. B., and Janowitz, H. D., J. A. M. A. 156:1221-1225 (Nov. 27) 1954.

Twenty years have elapsed since the original description of regional ileitis as a clinical and pathologic entity by Crohn, Ginsburg and Oppenheimer. During this period the authors have maintained a keen interest in this entity. As a result, they have collected and studied 562 cases. The experience gained over twenty years in the care of this relatively large number of patients furnished the material for the present study.

The granulomatous, cicatrizing lesion classified as regional ileitis has been shown to occur in any part of the small bowel, as well as the duodenum and even the stomach. In the vast majority of cases, however, the terminal portion of the ileum is involved.

The cause of this disease remains unknown. It has been well established, however, that the characteristic pathologic process results in local lymphatic involvement.

There is no specific therapy for this disease. All the currently employed measures are supportive. Because of the high rate of recurrence of ileitis after short-circuiting or resection types of surgery has resulted in reevaluation of the surgical criteria. At present the consensus appears to be that surgical intervention should be deferred until the pathologic process is quiescent, and surgery restricted to the complications associated with this disease. The complications indicating operative treatment are (1) obstruction, (2) fistula formation, (3) a granulomatous mass and (4) continued activity of the disease despite vigorous medical care and when the process is limited in extent.

M. O. CANTOR, M.D.

Prognosis in Cancer of the Uterine Cervix based on the Vaginal Smear Before Treatment. Graham, J. B.; Graham, R. M., and Liu, W., Surg., Gynec. & Obst. 99:555, 1954.

This article is a report of the authors' efforts to provide a method of precise individual selection of treatment for cancer of the uterine cervix.

Up to now the choice of treatment, irradiation or surgical intervention, has depended primarily upon the inclination of the therapist.

Analysis of pretreatment vaginal smears from 239 patients with cervical cancer has disclosed characteristic changes in the benign basal cells of the vaginal smear.

Follow-up study has suggested strongly that such pretreatment observations are indicative of a tumor that will respond favorably to irradiation. It is called SR—the sensitization response—and is regarded by the authors as a useful prognostic index in patients with cancer of the cervix.

The estimation of SR is a technic that can be taught and learned in a reasonable time.

In patients with poor responses the salvage rate was distinctly better in the surgical group than in the group treated by irradiation. Series of 136 patients treated radiologically and 103 patients treated surgically are presented.

THOMAS WILE

The Surgical Treatment of Peptic Ulcer. Wangensteen, O. H., J. Iowa State M. S. 44:365-373 (Aug.) 1954.

In reviewing the Vital Statistics of the United States for the past twenty years, the author notes that there has been only a 10 per cent reduction in the mortality rate for peptic ulcer. When compared with the marked decrease in the mortality rate for acute appendicitis and intestinal obstruction during this same period, the improvement in the status of peptic ulcer is meager indeed. In an attempt to determine the reason for this, the author reviews the various surgical procedures that may be indicated in the management of a peptic ulcer.

Perforation of a peptic ulcer is an immediate indication for surgical management. The mortality rate for this procedure has declined considerably in the past twenty years. Whereas formerly a mortality rate of 20 to 25 per cent was associated with this complication of peptic ulcer, today the rate is well under 10 per cent. In fact, in many hospitals throughout the country a mortality rate well under 5 per cent is currently reported. Despite the recent re-appearance of nonoperative management of this complication, the consensus favors operative closure of the perforation. There are some surgeons who not only advocate immediate operation, but urge gastric resection, particularly for patients seen early and patients in good condition.

Obstruction is an undisputed indication for surgical treatment. Obstruction that is not relieved by gastric suction and lavage suggests that stenosis and not edema is the obstructing process. Gastric resection is indicated in such cases.

Gastroduodenal hemorrhage and its management constitute by far the most important factor responsible for the elevated mortality rate for peptic ulcer. In the author's opinion, when surgeons learn to manage the threat of hemorrhage satisfactorily, the mortality will largely have disappeared. Because of the gravity of this complication and with the satisfactory operative technics available, there is no good reason to withhold surgical treatment from patients who have had more than one episode of bleeding. Even those patients with hematemesis without obvious evidence of peptic ulcer at operation should be treated by a conventional three-quarters gastric resection.

Gastric ulcerations that fail to heal completely after a Sippy regime for two to three weeks should be operated upon. In addition, peptic ulcerations that cannot be differentiated from cancer or the healed gastric ulcer that recurs frequently at the same site should be subjected to gastric resection, because of the real danger of carcinoma.

Operation for the relief of peptic ulcer effects satisfactory protection against recurrent ulcer in a very high percentage of cases. In an effort to avoid some of the undesirable sequelae associated with the standard type of gastric resection, the author proposes the use of segmental gastric resection. No recurrences of ulcer were observed in 100 patients so treated at the author's clinic. However, the incidence of the dumping syndrome was such that an improvement in this surgical procedure was considered indicated, and tubular gastric resection was devised in the treatment of duodenal ulcers. Since much of the lesser curvature of the stomach is not removed, this operation cannot be used in the management of gastric ulcers of the lesser curvature. The author expresses the opinion that tubular resection is probably the most acceptable procedure for peptic ulcer.

M. O. Cantor, M.D.

Total Gastrectomy for Gastric Cancer: Effect upon Mortality, Morbidity, and Curability. Marshall, S. F., and Uram, H., Surg., Gynec. & Obst. 99:657, 1954.

Marshall and Uram review the cases of 202 patients subjected to total gastrectomy. Malignant tumors were present in 184. The mortality rate from 1927 to 1943 was 34.6 per cent; it is now only 8.7 per cent. The prognosis, however, is not improved. The authors are certain that total gastrectomy should *not* be used as a routine procedure for gastric cancer, since the five-year survival rate is not increased by this radical procedure. The surgical cure of gastric cancer depends not only upon early diagnosis and the type of operation; of still greater importance is the type of growth. The rapidly growing cancers often cause no early symptoms, and of what value is total gastrectomy (or radical mastectomy, for that matter) when the cancerous cells have spread beyond the confines of the originally involved organ one is thinking of removing *in toto*?

Richard A. Leonardo, M.D.

Closure of an Atrial Septal Defect and Pulmonary Valvulotomy in a 49-year-old man. Bjork, V. O.; Crafoord, C. and Varnauskas, E., Ann. Surg. 140:212, 1954.

The authors, in Stockholm, Sweden, have applied the described technic for closure of interatrial septal defects in 12 cases, with 2 deaths.

Closure of the 4x5 cm. defect was achieved by a purse-string suture placed in the septal rim, with the aid of a guiding finger introduced through the right auricular appendage.

Two months later cardiac catheterization proved the left-to-right shunt to be almost eliminated. Three months after the operation the patient felt greatly improved and returned to work as a barber.

THOMAS WILENSKY, M.D.

Experiences in the Surgery of Portal Hypertension. Dotta Gupta, A. K., Indian J. of Surg. 16:101 (June) 1954.

The author reviews 74 cases of portal hypertension due to intrahepatic obstruction and treated in the surgical department of the Medical College Hospitals in Calcutta, India, during the past ten years. All patients had splenomegaly, and ascites was present in 21 cases. In the author's personal series of 30 patients, 5 were reported to have gastrointestinal bleeding. No cases of extrahepatic obstruction were encountered.

A splenectomy is of definite value in the early stages of congestive splenomegaly without a history of hemorrhage or ascites. This was performed in 35 cases, with a 37 per cent mortality rate. Postsplenectomy bleeding occurred in 11 per cent.

The author advises the use of either a shunt operation or ligation of the hepatic and splenic arteries in cases of gastrointestinal hemorrhage without ascites. When ascites is the predominant abnormality, this ligation is the procedure of choice.

No successful venous shunts are reported in the series. Arterial ligations were performed in 7 patients and combined with splenectomy in 2. Of patients with ascites, 2 had no recurrence eleven months after the operation. In the cases of 3 others the operation was too recent. No postoperative deaths occurred. However, both patients treated with ligation of the hepatic artery for ascites with hemorrhage died postoperatively. The hepatic artery ligation was combined with splenectomy in 2 patients without ascites or hemorrhage. One was well ten months later, and the other died postoperatively in hepatic coma.

Poor results are reported in the surgical treatment of ascites with omentopexy and internal drainage.

The historical and current medical literature relating the concepts of portal hypertension and its treatment is well documented by the author.

MORRIS T. PARKER, M.D.

Surgical Management of Low Back Disability. Carr, C. R., and Dunn, A. W., U. S. Armed Forces M. J. 5:1117, 1954.

The authors point out early that in a cross section of orthopedic clinics only about 5 per cent of the low back disabilities are or become conditions requiring surgical treatment. The paper is limited to the surgical aspect.

The history of spinal fusions is reviewed, from Ollier in 1867 and his osteoperiosteal graft to present-day H grafts. The development of ruptured disks from trauma is briefly described as a clinical entity.

The paper indicates that the causes of low back pain indicating surgical intervention are: (1) trauma, such as a ruptured disk or fractures of articular processes, laminae and pedicles; (2) Congenital anomalies, such as spondylolisthesis, increased lumbosacral angle and others, and (3) degeneration of the intervertebral disk. Each of these categories is discussed and enlarged upon; illustrative case histories are given, and illustrations are used.

In the latter part of the paper the author discusses spinal fusion versus simple disk removal, versus disk removal plus spinal fusion. The opinions and some statistics of other authors are reported. No further opinions or conclusions on this old problem are made. The paper is a general review of the low back problem.

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The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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The Journal of the
International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Vol. XXIII FEBRUARY, 1955 No. 2

Original Articles

The Place of Vagotomy in Gastrointestinal Surgery

A. DAVIS BEATTIE, M.B. (London), B.S. (London),
F.R.C.S. (England), F.R.C.S. (Canada), F.A.C.S., F.I.C.S.
SWIFT CURRENT, SASKATCHEWAN, CANADA

A GREAT deal of research, both clinical and experimental, has been carried out on the results of vagotomy since Dragstedt and Owens[1] performed the first really successful operation of this kind on the human subject in 1943. The recorded vagotomies in the world literature now total many thousand and, while this procedure has in the past been the center of considerable controversy and is still a bone of contention among the more conservative surgeons, sufficient accurate evidence is now available to permit reasonably reliable assessment of its effectiveness and sequelae.

In other words, it is high time for the merits of this operation as a surgical procedure to be properly evaluated, and this can be accomplished successfully only by a strictly logical approach to the subject, which, though essentially critical, must be unprejudiced by any individual bias. Neither personal preference for an alternative operation nor lifetime experience in the technic of any particular procedure should be allowed to cloud the issue. Despite the obvious necessity for impartial assessment of the evidence concerning any new surgical procedure, these factors have always been the main stumbling blocks to surgical progress in the past.

Let us, therefore, approach the subject of vagotomy on this basis and see whether a logical consideration of its rationale and a critical analysis of its sequelae will not help to clarify the confusion of thought that still seems to surround this subject.

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 13, 1954.

Historical Survey.—First of all, it is well to be reminded of some of the original experimental work on the vagus nerves, the results of which finally led Dragstedt to the conviction that section of these nerves might have a beneficial effect on peptic ulceration.

Cushing,[2] in 1932, first demonstrated the existence of a nerve pathway between the cerebral cortex and the upper part of the gastrointestinal region. From combined clinical and pathologic evidence, he showed that a definite nerve tract connects the vagal centers with the cortex and that irritative lesions along this tract resulted in ulceration of the stomach and duodenum. He further demonstrated that this was due to hyperactivity of the vagal centers and that same result could be produced by the action of psychic stimuli on the area of cerebral cortex at which this tract begins. This important work confirmed the investigations of previous research workers on experimental animals (dogs). Stahnke,[3] in 1924, had already produced typical peptic ulcers in these animals as a result of the increased neurogenic gastric secretion following vagal stimulation. Hartzell,[4] in 1929, had shown that complete division of the vagi resulted in a permanent reduction of gastric acidity; and Beaver and Mann[5] had completed this chain of evidence in 1931 by demonstrating that the only dogs to escape peptic ulceration after physiologic gastroenterostomy were those in which complete vagotomy had also been performed.

Experimental procedures along similar lines on the human subject were proceeding coincidentally with this animal research work and had even started prior to it. Exner and Schwarzmann,[6] in 1912, first described the technic of subdiaphragmatic vagotomy carried out by them for tabetic crisis. They reported two years later[7] the results of 14 personal and 6 collected cases in which it was not uniformly successful; but their work is interesting as the first recorded attempt at complete abdominal vagotomy. Stierlin[8] observed that the most effective of all operative procedures carried out at that time for gastric ulcer was sleeve resection, and argued that this might be due to division of the vagal supply. He therefore developed, in 1920, the operation called "gastric circumcision," in which he divided the wall of the stomach circumferentially above the lesion, down to but not through the mucosa, and then oversewed the incision line (Fig. 1). Bircher,[9] the same year, developed independently an alternative technic for denervation of the pyloric area as treatment for peptic ulcer at this site. Schiassi[10] described, in 1925, an operation for stenosing duodenal ulcer, which consisted of a modified combination of these two methods, associated with gastroenterostomy. He appears to have had some undoubted successes, but it is a matter of controversy how much the attempt at local vagotomy contributed to his results, in view of the fact that it was almost certainly incomplete and that all his patients came from the clinical group which might be expected to give a moderately good response to gastroenterostomy alone.

These, and later attempts along similar lines, were reviewed by Hartzell[11] in his paper. As might be expected from the standpoint of our greater knowledge of this subject today, none of them had proved particularly successful. Pieri and Tanferna[11] rightly concluded that the main cause of their failure lay in the improbability of obtaining complete denervation by the technics described, rather than in any inherent fallacy of the basic physiologic theory involved. They were therefore stimulated to develop the transthoracic approach and were, in 1930, the first to describe this. It thus seems paradoxical that their own failure to obtain uniformly good results would appear to have been due to incomplete vagal section also. Not until 1934 were the first really successful transthoracic vagotomies reported from Dragstedt's clinic, as the sequel to intensive research on the vagal course and distribution.

I should like here to pay tribute to Dragstedt and his co-workers for their vision in recognizing the potentialities of vagal section and for the pioneering effort that has led to the establishment of vagotomy both as a thoroughly practicable surgical procedure and as a most valuable weapon in attacking the problem of peptic ulceration. What led these men to pursue such a goal was their opinion that gastrectomy did not supply the complete surgical answer. The initial Polya technic was even then beginning to be modified by a more extensive removal of the acid-secreting mucosa in an attempt to eliminate the problem of recurrent ulceration, and although this process of an ever-increasing gastric resection was still in its early stage of development they saw the trend and were convinced that it was wrong. In their opinion, this type of surgical attack for duodenal ulcer was not only illogical, since the ulcer had often to be left *in situ,* where it might give rise to subsequent complications, but unphysiologic, as the reduced gastric acidity was obtained only at the expense of lowered stomach capacity and digestive capability. If that was a logical analysis of the situation in the nineteen-thirties, how much more logical it is today, when the vogue for duodenal ulcer surgery is a drastic, subtotal resection!

Anatomic and Physiologic Aspects of the Vagus.—What is the rationale underlying the modern operation of bilateral vagal section? Cushing's original work, referred to earlier, suggested a definite connection between vagal stimulation and ulceration of the upper part of the gastrointestinal tract. But, in order to appreciate properly the basic principle involved, it is necessary to consider in some detail both the anatomic and the physiologic nature of the vagus nerves in their gastrointestinal distribution.

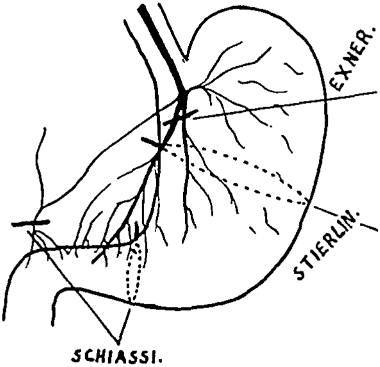

Fig. 1.—Technics of vagotomy employed by Exner and Schwarzmann, Stierlin, and Schiassi (see text).

The abdominal branches of these nerves run downward through the posterior mediastinum, forming an intricate plexus in the neighborhood of the esophagus. Most of the nerve fibers lie on the esophagus, but some of them run in loose connective tissue surrounding it. Only as the esophageal hiatus is nearly approached do these filaments begin to form into two well-defined trunks, which run through the opening in the diaphragm along with the esophagus, the anterior nerve lying on its surface but the posterior one coursing downward parallel to it, under cover of the right crus and up to 2.5 cm. away from the esophagus. Despite what has been reported to the contrary, this arrangement of the nerve trunks is remarkably consistent and occurs in over 95 per cent of cases. The only common variants are separation of the posterior nerve into multiple branches—I have seen it in seven parallel divisions in one patient—or its descent on the left side of the esophagus. The anterior vagus gives off several branches to the lower segment of the esophagus in this part of its course, during which it nearly always sends a large communicating nerve to join the posterior vagus. It ends by bifurcating at the level of the cardiac orifice, its left branch breaking up to supply the anterior surface of the body and fundus of the stomach and its right branch running downward through the gastrohepatic omentum near the lesser curvature, giving off prepyloric and pyloric branches and terminating as a hepatic nerve (Fig. 2*A*). The posterior vagus is much the larger of the two nerves. It gives off a branch that runs downward on the stomach to supply its whole posterior surface and then runs backward, through the fold of peritoneum which contains the left gastric artery, to the region of the celiac plexus. At this level it gives off duodenal and pancreatic branches and then continues downward through the mesenteric attachment of the small intestine, supplying branches to the jejunum and ileum. It appears to peter out in the neighborhood of the ileocecal sphincter and, despite suggestions to the contrary, there is no real clinical, experimental or histologic evidence that it supplies the bowel much beyond this point (Fig. 2*B*).

From the physiologic point of view, the vagus is a typical medullated cranial nerve with sensory, secretory and motor functions. The sensations deriving from most of the alimentary tract are conveyed to the higher centers through the sympathetic nervous system but, despite the work of Hesser[12] and others, there is no doubt that the vagus carries at least some of the sensory fibers from the stomach and duodenum. On three successive occasions I have stimulated the proximal ends of the vagus nerves after their exposure and division in the abdomen under combined spinal and local anesthesia. Each time the same reactions were elicited from the patient. Mild stimulation is at first felt as a vague aching pain in the high epigastric and substernal areas, accompanied by a feeling of nausea and dizziness, but continued stimulation or a stronger faradic current results in typical ulcer pain of really acute intensity. This explains the immediate relief of all sensation from both stomach and duodenum which is so characteristic after vagotomy, and which is so lastingly complete that even quite large secondary gastric ulcers may form almost asymptomatically if

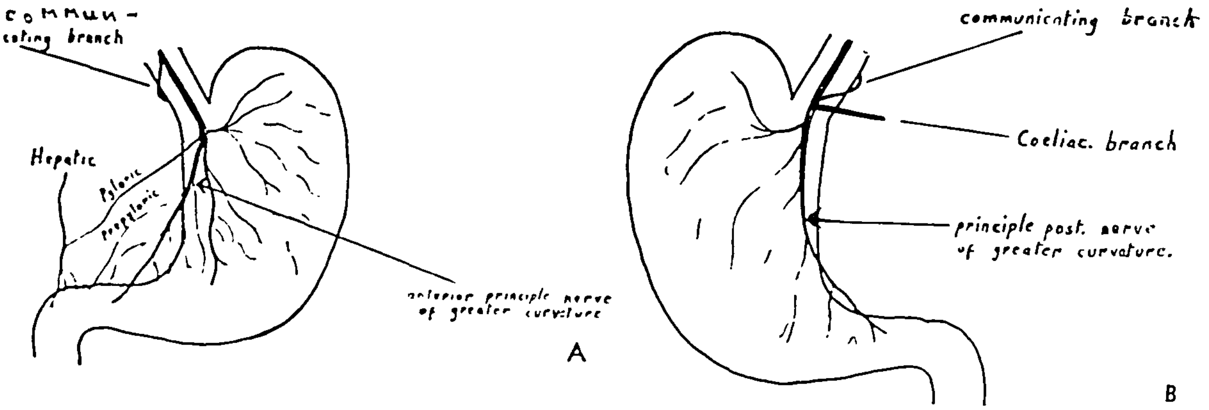
communicating branch
Hepatic
Pyloric
prepyloric
anterior principle nerve of greater curvature
A
communicating branch
Coeliac. branch
principle post. nerve of greater curvature.
B

Fig. 2.—*A*, anatomic sketch indicating course of anterior vagus nerve. *B*, similar sketch of course of posterior vagus.

vagotomy is performed without any associated gastric drainage procedure to prevent subsequent retention of the gastric contents. The motor functions of the vagus are twofold. The investigations of Carlson[13] and McCrea[14] more than thirty years ago, which have since been confirmed by many other workers in this field, showed that the vagal supply to the bowel is responsible for regulation of the depth and intensity of peristalsis. They further demonstrated that maintenance of the underlying muscle tonus, on which these peristaltic movements are superimposed, is not a function of the vagus but is controlled by the sympathetic nerve supply. As has since been shown, by Tyrrell-Gray[15] and others, the two intestinal plexuses are primarily responsible for bowel movements and secretion; and both vagal and sympathetic supplies exert their action indirectly, by modifying this basic nervous control mechanism.

It will be seen from the foregoing evidence that the sympathetic and parasympathetic systems are synergistic in their action in this respect, rather than antagonistic as is commonly taught, and this applies even to their control of the cardiac, duodenal and ileocecal sphincters.

As might be expected from its distribution, the vagus has secretory functions involving the liver, pancreas and small bowel, the experimental work on which will be discussed later. Its most obvious action, however, is on the stomach and early duodenum—the part it plays in inauguration of the psychic phase of gastric secretion and its influence on the succeeding hormonal phase of digestion. This psychic phase is a reflex mechanism primarily set in motion by stimuli from the higher centers, accentuated by the mechanisms of mastication and deglutition and subsequently augmented by the "milking" effect of gastric peristalsis. The gastric juice secreted is not only particularly rich in pepsin but contains a much higher percentage of hydrochloric acid than does that of the later hormonal stage. The flow of this concentrated juice persists for some time and, apart from its own strong digestive properties, contributes to the intensity of the succeeding chemical phase by increased production of gastrin which results from absorption of the polypeptide end results. Carlson[13] showed that there is normally a small continuous secretion of this neurogenic juice in dogs, even during prolonged fasting; and Dragstedt and Schafer[16] demonstrated that this secretion is present to an excessive degree in the typical vagotonic patient with duodenal ulcer even during sleep, and that it is increased by emotional states and nervous stress. Wolf and Wolff[17] were the first to prove definitely, in 1942, that this abnormal psychic secretion of highly digestive juice is responsible for the development of preulcerative changes in the human gastric mucosa.

Finally, recent research has suggested that yet another important function of the vagus is the control of arteriovenous shunts in the bowel, similar to those occurring in the kidney. Such potential shunts have been demonstrated to be exceedingly numerous throughout the submucosa of the stomach and duodenum, particularly along the lesser curvature and in the early duodenum, and are apparently part of the mechanism through which the vagus exerts its action. Stimulation of the vagi causes them to open, diverting a good deal of the blood supply from the mucosa to the submucosa and greatly increasing the flow to the secretory glands of this region. Prolonged stimulation has been shown to cause such dilation of these loops, and so much resultant pooling and stagnation of blood cells in them, that actual thrombosis may occur. The consequent devitalization of the already ischemic overlying mucosa is then often sufficient to cause necrosis ulceration.

The Sequelae of Vagotomy.—The sequelae of vagotomy in the human subject are those which might be expected from a study of the anatomic distribution of the vagus nerves and their physiologic functions.

The most dramatic of these is the immediate relief from all pain and other ulcer symptoms, noticed by the patient as soon as he recovers full consciousness after operation, though its full benefit is temporarily masked by the rapid development of the invariable paralytic ileus. The latter becomes clinically apparent within the first twelve hours and lasts for some three days or so, after which the motor plexuses of the bowel take over and normal peristalsis returns. This, however, is not of the same type as before operation. Segmental peristalsis in the small bowel is lessened in depth and frequency, but peristaltic rushes are increased in number, so that the bowel gradiant is accentuated and the passage of intestinal contents actually accelerated. The resultant looseness of the bowels may become actual diarrhea in about 15 per cent of cases, though it always clears up within a week or two. This postoperative ileus is confined to the stomach, duodenum and small bowel, and never affects the large intestine except indirectly. Three months after the operation the physiologic function of the whole bowel has apparently returned to normal, except that the stools remain permanently somewhat softer than before and that a small proportion of patients continue to have occasional mild flatulence.

Such is the picture after vagotomy with associated pylorectomy, pyloroplasty or gastroenterostomy; but it is by no means so rosy after vagotomy alone. Contrary to what is commonly taught, the stomach does not end at the pylorus but forms a physiologic whole with the duodenal bulb. The sphincter that separates the latter from the remainder of the first part of the duodenum constitutes the true termination of the stomach, and the function of the pyloric sphincter is to act as a resistance against which the strong antral contractions can churn the gastric contents. Obviously, therefore, it must possess a much stronger antagonistic sympathetic nerve supply than is necessary at the true bowel sphincters. When complete vagal section has been effected, the unopposed sympathetic system thus produces its maximum effect at this site, and the pylorus goes into relative spasm. This does not occur immediately but develops gradually as the tone of the gastric muscle increases, and it then sets up the characteristic functional changes and symptoms of postvagotomy retention. Moore[18] in 1946 and Grimson[19] in 1947 showed by repeated radiologic examination and pressure-recording intraintestinal balloons that the result is increased gastric tone and stronger peristaltic waves, which may reach two to three times their preoperative intensity within three years; and I have demonstrated that this is associated with hypertrophy of the stomach muscle. The characteristic pain of intestinal muscle tension develops, and, since abdominal localization is poor and the pain is of the same type as that of duodenal ulcer, the patient often mistakenly believes that the latter has returned. Heartburn and waterbrash occur, since the hyperacid gastric contents cannot escape through the spastic pylorus, and flatulent distension is common—largely the result of aerophagy by the patient, in an attempt to relieve the sensation of muscle tension resulting from the pylorospasm, which he feels subjectively as gastric distention. The stagnation and consequent fermentation of the stomach contents, resulting from excessive delay in gastric emptying, causes frequent eructation of foul gas and even occasional vomiting; offensive diarrhea supervenes at intervals, when this noxious

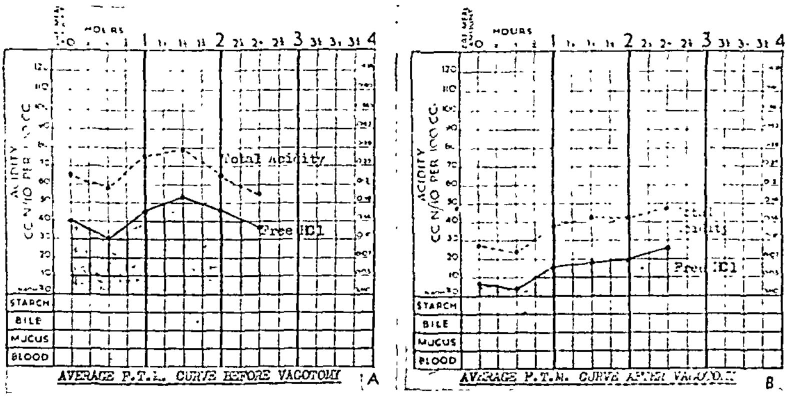

Fig. 3.—Comparative secretion of free hydrochloric acid before vagotomy (*A*) and after vagotomy (*B*).

pool intermittently finds its way through the spastic pylorus to irritate the lower reaches of the gastrointestinal tract.

Even symptoms closely mimicking those of perforation or minor gastric hemorrhage may occur, but these too are due to the acute gastric distention that takes place. It is the knowledge of the occurrence of such unfortunate sequelae and a lack of appreciation of the factors responsible for them which have led so many surgeons to abandon vagotomy and others to delay its adoption. My own experience with regard to the consequence of simple vagotomy is shown in Table 1, which also shows the distribution of symptoms. In my original series of 103 simple vagotomies, undertaken in 1946 and 1947, no fewer than 76 of the patients have had to be re-operated on by myself or others to relieve these retention symptoms, and the failure rate thus approaches 75 per cent. In 12 cases large secondary gastric ulcers had formed as the result of prolonged irritation of the stomach; yet, in every instance, laparotomy showed complete healing of the original duodenal ulcer. The only consistent pathologic observation in all these patients was the typical hypertrophy and dilatation of the stomach that follow protracted pylorospasm.

Some degree of temporary dysphagia frequently develops following abdominal vagotomy. It seems to be due to a relative achalasia of the lower part of the esophagus, probably due to division of the vagal filaments that supply it; but, for some unexplained reason, it often does not make an appearance until the seventh to tenth day of convalescence. However, it is neither complete nor continuous; it always passes off within a week or two, and there have never been any undesirable later sequelae attributable to this source.

Apart from transient dysphagia and temporary postoperative ileus, which, after all, are only to be expected if vagotomy has been properly performed, what are the main after-effects of this procedure? The most dramatic is the lowered level of gastric acidity. Thornton[20] and Grimson[21] showed *independently in 1946 that the* continuous fasting secretion of **highly** acid juice, so characteristic of t underlying the duodenal ulcer diathesis and undoubtedly the main factor responsible for the persistence of chronic ulceration, is greatly diminished. I have shown[22] that the free hydrochloric acid secreted after operation is only a third of the preoperative quantity during the digestion of a normal meal (Fig. 3). Moreover, these effects are permanent if vagal section has been complete. Fractional and insulin test meals given to patients for as long as six years after the operation fail to demonstrate any significant deterioration. There was originally some fear, based on experimental work with dogs, that regeneration of the vagi might occur, and this led to such expedients as enclosing the cut ends in silk bags. Such regeneration has, however, never been definitely proved in the human subject, and it seems probable that, in the few recorded instances in which it has been suspected, it was invariably due to incomplete vagotomy in the first place. In my own series of almost 700 cases, careful follow-up studies by insulin test meals have not shown a single instance of its occurrence. The only 3 apparent failures of this kind were all observed on further surgical exploration to be due to a large branch of the vagus having been missed at the original operation. After all, the vagus is a medullated nerve, similar histologically to the ulnar or sciatic, and it behaves in the same way. Full and adequate regeneration is difficult enough to obtain in such nerves even with the most careful apposition of their cut ends; so there is very little likelihood that this will occur in the vagus, provided at least 1 inch (2.5 cm.) is removed from each nerve, and particularly since the diaphragm intervenes between these cut ends in the modern abdominal operation.

The effects of vagal section on the secretions of the liver, pancreas and small bowel are less well established, and there is room for a good deal of further experimental work in this direction. Ivy,[28] in 1934, claimed that it was followed by a slightly decreased secretion of bile and pancreatic juice, but this has not been confirmed by the work of Routley,[24] which suggests that vagotomy has little effect on either the rate of secretion or composition of the pancreatic enzymes. Pfeiffer[25] described, in 1940, a temporary drop in the blood calcium level of the human subject after the operation, similar to that observed in experimental dogs, but I have not been able to confirm this. There is no doubt, however, that vagal section sometimes alters the dextrose metabolism of the body in a way as yet unexplained, since attacks of hypoglycemia after the operation develop in about 10 per cent of patients. They come on shortly after food and are quite typical, patients sometimes volunteering the statement that their sensations are identical with those which they experienced during the deliberate hypoglycemia induced by an insulin test meal. They are usually mild, rarely last for more than a few minutes if untreated, and are rapidly controlled by the ingestion of dextrose. They are hardly ever incapacitating and gradually diminish in both frequency and intensity, completely disappearing within two years in even the severest of cases. It is significant that the incidence of this condition is much the same in the gastric retention following vagotomy alone as it is in the much more rapidly emptying stomach after an associated pylorectomy or gastroenterostomy. It cannot, therefore, depend on the rate of stomach emptying, though the attacks are highly similar to those which occur in the "dumping syndrome" that may follow gastrectomy. My personal view is that, whether they follow vagotomy or gastrectomy, these hypoglycemic attacks are due to the same cause—interference with the vagal supply to the liver and pancreas.

Vagotomy for Duodenal Ulceration.—An analysis of all this evidence suggests that vagotomy, with some associated gastric drainage procedure to prevent the retention that otherwise inevitably results, ought to be an ideal operation for duodenal ulceration. But does it offer any material advantages over gastrectomy, which has held sway for so long as the operation of choice in this condition? Let us compare their end results.

The relatively small stomach that results from the very radical resections of modern gastrectomy is often incapable of carrying out its physiologic functions adequately. It can neither hold a sufficiency of food nor digest it properly; and, not surprisingly, this leaves much to be desired from both the physiologic and the economic standpoint. Recent analyses of the after-results of this type of operation confirm the view originally expressed by St. John,[25] that they are not nearly so satisfactory as was at first believed. Gastrectomy is a mutilating procedure, and a high proportion of patients suffer afterwards from recurrent gastrointestinal upsets, often sufficiently severe to affect adversely their whole economic life. Careful scrutiny of the published reports of this operation during the past decade reveals that about one-sixth of the apparently successful surgical cures are, in fact, poor economic results, whilst nearly a third of them, relatively speaking, are physiologic failures. All gastric surgeons of experience will probably agree that not more than 70 per cent, at most, of these patients can live entirely normal dietetic and economic lives afterward. Though this may be a comparatively small price to pay for freedom from dangerous complications or possible malignant change in the case of gastric lesions resistant to treatment, it ought not to be necessary for chronic duodenal ulceration, which is not subject in the same degree to such hazards.

Vagotomy, on the other hand, reduces the dangerous acid secretion just as effectively, and yet leaves the patient with a relatively intact and physiologic gastrointestinal tract, especially if combined with pylorectomy or pyloroplasty. The experience of others, and an eight-year follow-up of my own series of cases, shows that the duodenal ulcer invariably heals spontaneously and that recurrent ulceration is extremely rare if neurectomy has been complete. Convalescence is much shorter and smoother. Despite the inevitable ileus, postoperative gastric suction is hardly ever necessary, and a rapidly increasing graduated diet can always be started within twenty-four hours. As a result, rapid dietetic progress is possible, and most patients are taking full, normal meals by the time they leave the hospital, usually on the tenth to the twelfth postoperative day. Because of the absence of all unpleasant sequelae, such as the "small stomach syndrome" which so often complicates the early convalescence from gastrectomy, and the complete relief from all previous

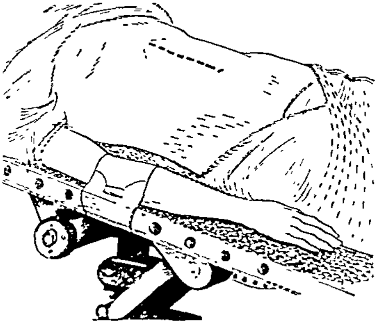

Fig. 4.—Correct position of patient for vagotomy, with a reverse Trendelenburg tilt of approximately 25 degrees (see text).

stomach symptoms, the psychological improvement of these patients is astonishingly rapid. For the first time in years they are restored to normal digestive life and can eat, drink and smoke with impunity. There is therefore much better adjustment to both general environment and work conditions than is possible after gastrectomy, when the "stomach consciousness" of the patient is often kept alive by the continued necessity for a modified gastric regime. A further cause of the vagotomized patients' new harmony with their surroundings may lie in their subsequent immunity from the reflex digestive instability that accompanies mental stress even in normal persons. Many patients, at their postoperative reviews, volunteer the statement that their work requires less effort than ever before and that their powers of concentration seem to have improved. Almost all of them gain weight fairly rapidly after the operation —the average gain in my own cases being 12.9 pounds (5.8 Kg.) in three months; and most of them are back at their previous occupations within two months, often despite protracted absence from it during years of previous incapacitation.

A short analysis of my own results, which will shortly form the subject of another paper, is shown in Table 2. It will be seen that over 90 per cent of the patients were relieved permanently from all gastrointestinal symptoms within three months of operation; that a further 5 per cent are good "economic cures," though with incomplete dietetic adjustment and a tendency to occasional hypoglycemic attacks for the first six to twenty-four months; and that less than 5 per cent are poor results. The last-mentioned group would have been even smaller if I had originally exercised greater care in the selection of cases for operation, for it includes a number of mildly neurotic patients whose vagotonia, with the resultant duodenal ulceration, was merely an incident in the course of their general nervous instability. This type of person is unhappily familiar to all abdominal surgeons because of the poor subjective results that are liable to follow any planned operation on the gastrointestinal tract.

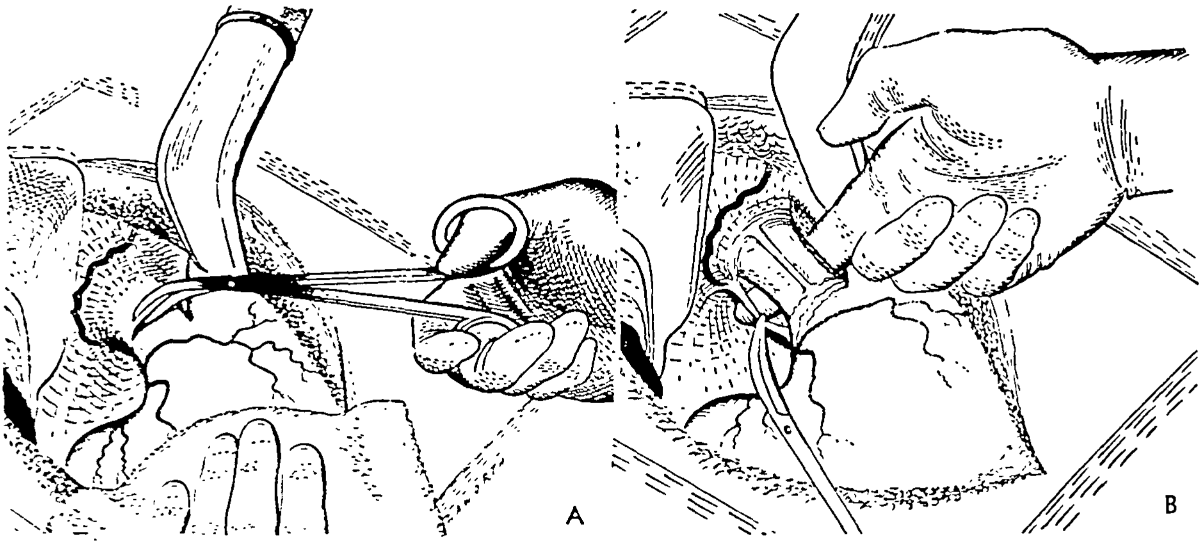

Fig. 5.—*A*, transverse division of parietal peritoneum over lowest portion of esophagus (see text). *B*, right vagus seized with long curved forceps as it lies over surgeon's forefinger (see text).

With only 1 exception, however, all the results I have described as "poor" have actually been surgical cures as far as duodenal ulceration was concerned. None of the patients has had a recurrence of the preoperative symptoms, but they have been graded in this category because of subsequent failure to readjust socially and economically and because of the persistence of vague gastrointestinal dyspepsia for more than two years after the operation. Vagotomy, therefore, in my hands, has yielded 96 per cent of subjective cures and almost 100 per cent of objective successes over the past nine years. Furthermore, its low operative mortality rate offers yet another advantage over gastrectomy. I have had only 3 deaths in my series—2 of them due to early imperfections in technic, which have since been rectified. The overall operative mortality rate is thus under 0.5 per cent, and has been even lower over the past five years, since I have not lost a patient in my last 450 cases.

TABLE 1.—*Results of Simple Vagotomy*

No. of Years After Operation	*No Symptoms*	*Mild Symptoms*	*Subsequent Pylorectomy*	*Subsequent Gastroenterostomy*	*Subsequent Gastrectomy*	*Total Cases Requiring Further Operation*
1-2	33	46	8	13	3	24
2-3	23	29	23	1	3	27
3-4	22	24	5	1	—	6
4-5	20	18	6	—	2	8
5-6	18	15	4	1	—	5
6-7	15	15	2	—	1	3
7-8	13	14	—	—	3	3
Cases requiring further operation:			48	16	12	76

Vagotomy for Other Conditions.—As with duodenal ulceration, almost all the other conditions in which vagotomy has real value are those in which control of gastric hyperacidity is a prerequisite to cure. Secondary ulceration following inadequate gastrectomy or gastroenterostomy is one of these. Alternative surgical procedures to deal with this unfortunate complication present a formidable undertaking for patient and surgeon alike. They are lengthy and difficult, and they carry a relatively high surgical mortality rate.

TABLE 2.—*Results of Vagotomy for Peptic Ulcer (1946-1954)*

Vagotomy for chronic gastric ulcer		8	
Vagotomy for chronic duodenal ulcer	623	687	
Vagotomy for secondary peptic ulceration	55		
Vagotomy for high lesser-curvature ulcers	9		
Total		695	
Successes:			
Cases symptom free within 3 months	622	658	= 95.8%
Cases symptom free in 6-18 months	36		
Incomplete successes:			
Cases with persistent minor symptoms after 2 years		29	= 4.2%
Failures:			
All operations on chronic gastric ulcer (See text)		8	
Complications after operation:			
Transient dysphagia during first month of convalescence	104		
Post-ileus diarrhoea (lasting 10-14 days)	78		
Mild hypoglycaemic attacks	56		
Severe hypoglycaemia (cleared within 2 years)	4		

Average gain in weight 12.9 pounds

Deaths:
3 *Overall Mortality Rate* 0.43%

Simple vagotomy, without any other associated procedure, has shown itself to be equally successful in such cases, the reduction of acidity and the relief of secondary spasm allowing the ulcer to heal spontaneously in the majority of them. Another indication for vagotomy is the somewhat uncommon but distressing complaint of chronic prolapse of the gastric mucosa through the pylorus, the symptoms of which often parallel those of recurrent duodenal ulcer. The primary cause of this condition is hypertrophic antral gastritis, but hyperacidity of the vagotonic type is often associated therewith. Treatment of it by pyloroplasty or partial pylorectomy, the operations of choice, is therefore liable to result in later duodenal ulceration unless this is prevented by a vagal section performed at the same time.

Vagotomy may also be a valuable procedure in cases of high gastric ulcer, provided the ulcer is relatively small and not too long established. Such ulcers are notoriously resistant to medical treatment, and the only surgical alternative for these high ulcers of the lesser curvature is a very high gastric resection, with its considerably greater operative mortality rate and often unpleasant after-results. If vagotomy is employed sufficiently early, however, these lesions usually heal rapidly, the beneficial result being probably due more to the physiologic rest enjoyed by the stomach after operation, as a sequel to lessened peristalsis, than to actual lowering of the gastric acidity. For vagal section, even with an associated pylorectomy or gastroenterostomy, is of little benefit in the treatment of gastric ulcer at any other site. Although the fact has never yet been stressed sufficiently from the therapeutic angle, gastric ulcers can always be separated clinically and pathologically into two groups. The first are the primary gastric ulcers, which are never due essentially to hyperacidity and in the treatment of which there is, therefore, no rational basis for employing vagotomy. The second group comprises ulcers that have developed as a secondary complication of the long-standing pylorospasm that commonly accompanies chronic duodenal ulceration, or of the pyloric stenosis that follows it. In cases of this type it is not sufficient to deal only with the gastric lesion—to cure the patient, it is also essential to deal thoroughly with his duodenal ulcer diathesis. Radical gastrectomy, however, to say nothing of the gastrectomy *plus* vagotomy employed by some enthusiasts, is not necessary to attain this objective. Complete cure can be achieved by the easier and less mutilating operation of vagotomy and partial pylorectomy, together with local excision of the gastric ulcer. Except for the subchronic high lesions already mentioned, vagotomy should never be performed for gastric ulcer unless the ulcer is also resected. By the time such lesions reach the surgeon, they are frequently in a chronic state and usually will not heal after vagotomy alone, though the patient's signs and symptoms may be relieved. Ulcer complications are, therefore, quite likely to develop while both the patient and his medical advisor are lulled into a false sense of security.

A good deal has been written during the past few years about vagotomy in the treatment of colitis, and, though I have no personal experience of this, I find it difficult to believe that it can be of any real value. There seems to be no rational basis for it, since the vagus does not supply the colon and the end-effect of vagotomy on the small bowel is to increase the rate of progress of its contents, and not to slow up peristalsis. Ulcerative colitis is, however, a slowly progressing condition marked by characteristic remissions in all but its later stages, and with a notoriously psychic background; and this may perhaps have some bearing on the seem-

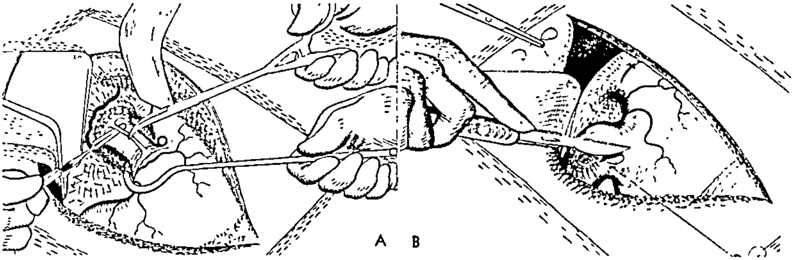

Fig. 6.—*A*, anterior vagus nerve standing out clearly under traction, to be dealt with in a manner similar to that employed with the right vagus (Fig. 5). *B*, duodenum freed and general abdominal cavity isolated; pyloric sphincter divided (see text).

ingly successful early results which are occasionally claimed.

Technic of Vagotomy.—Although the early vagotomies were all carried out by the transthoracic approach, this type of operation should never now be employed except in particular cases in which abdominal vagotomy is definitely contraindicated. Complete vagotomy is much less likely to be obtained by the transthoracic route, since it is only at the level of the diaphragm that the vagal plexus consistently coalesces to form definite nerve trunks. Transthoracic vagotomy does not permit the carrying out of a drainage procedure to prevent later retention of gastric contents, unless the abdomen is opened through the diaphragm at the same time. Moreover, if the actual lesion is not inspected in the abdomen, one can never be absolutely certain that the condition is only simple ulceration—roentgen diagnosis and even the most thorough preoperative investigations are never completely trustworthy, and there have been unfortunate instances in which an associated intra-abdominal carcinoma has been overlooked. Finally, there is no comparison between the convalescence from a thoracic operation and the much shorter and smoother one following abdominal vagotomy.

Although vagal section is much simpler when carried out from below the diaphragm, it is nevertheless by no means always an easy maneuver. It may be extremely difficult to obtain the exposure necessary for adequate visualization of the operative field, without which complete neurectomy is never a certainty. Abdominal vagotomy requires, more than most operations, an adequate knowledge of the normal anatomic picture and its variants; considerable experience in its technic, too, is essential for reliable results, since the surgeon's sense of touch is often the only operative criterion of the completeness of nerve section. Further, a good deal of judgment is required in selection of the best type of gastric drainage to employ in a particular case. The majority of surgeons who commonly perform vagotomy probably carry out a gastroenterostomy as well, and, while this may be an excellent operation in selected instances, it has certain disadvantages. Unless it is done at the pyloric antrum, which can be difficult technically, the distal "blind segment" of the stomach beyond the stoma sometimes gives rise to unpleasant postoperative symptoms. Vigorous peristalsis of this segment, working against the highly [illegible] produce a great deal of discomfort and even typical ulcer pain after a heavy meal. Gastroenterostomy has other drawbacks, too, in that it permits no direct internal visualization of the actual ulcer, and since its presence, combined with the pylorospasm, largely prevents the normal physiologic progress of food down the alimentary tract. Yet it may be the only possible procedure when extreme duodenal distortion and fixation prohibit any pyloric operation.

Alternative methods by which later gastric retention can be prevented are total pylorectomy with subsequent gastroduodenostomy along the lines of a Billroth I operation, or an associated hemigastrectomy such as that first advocated and since practiced by Orr and Johnson.[26] The ormer operation is a difficult technical eat in the presence of gross duodenal deformity, and the latter has several disadvantages. Besides involving the additional operative risks attendant on gastrectomy, it removes most of the mucosa responsible for the hormonal phase of gastric secretion. In addition to a lowered stomach capacity, the patient is therefore left with reduced digestive power—the avoidance of which constitutes the major advantage of vagotomy and was, indeed, the main reason for its original development. Associated partial gastrectomy is undesirable from every point of view. The disadvantages of these various operations, employed to abolish the effects of the pylorospasm consequent on vagotomy, led me in 1947 to investigate the possibility of carrying out some alternative procedure on the pylorus itself.[27] I soon discovered that localized sympathectomy of this region is an impossible surgical feat, and that anything in the nature of a simple pyloroplasty was a most difficult technical undertaking in the presence of the gross parapyloric deformity that so often exists in these cases. I found the solution to this problem to lie in partial pylorectomy combined with subsequent pyoroplasty; a procedure somewhat similar to that originally described by Judd[28] as an alternative operation to the simple gastrojejunostomy then in vogue as the surgical treatment for duodenal ulcer, and later discarded by him because of its poor end results; though, when it is combined with vagotomy, these are excellent. This operation prevents later spasticity of the pyloric sphincter by removal of an anterior segment of it, and yet does not destroy its function entirely. It permits removal of all anterior scar tissue, including any active ulcer at this site; gives ready access to any posterior ulcer that may be present, enabling it to be dealt with easily by excision or exclusion, and allows digital exploration of the stomach and early duodenum, as well as full visualization of the whole diseased area. Both the segment of bowel to be removed and the subsequent plastic repair demand careful planning in each individual case, but the whole maneuver is usually surprisingly easy and rapid.

I should now like to describe my own technic for this operation. The first essential is correct positioning of the patient on the table; Figure 4 shows the position adopted, which is a reverse Trendelenburg tilt of about 25 degrees. The second necessity is adequate lighting, which is obtained by inclining the main lamp to about 45 degrees and using special lighted retractors. An upper midline incision is made to obtain the necessary high exposure and to avoid the falciform ligament.

After the peritoneum has been opened, the pathologic condition verified and a general celiotomy carried out, a lighted retractor is inserted under the costal margin on each side. The liver is held out of the way, under an abdominal pack, by one of these. I have now discontinued the technic described originally by Dragstedt[29] for mobilizing the left hepatic lobe, since adequate exposure can be gained without this procedure by positioning the patient properly. The parietal peritoneum over the lower part of the esophagus is divided transversely (Fig. 5*A*) between the uppermost branches of the left gastric vessels and the point where it covers the esophageal opening in the diaphragm. Dissection with a small gauze swab on a holder will then readily expose the whole anterior surface of the abdominal portion of the esophagus. It is now possible to insinuate the right forefinger into the lower mediastinum posteriorly and to mobilize the thoracic portion of the esophagus within it, after which 2 or 3 inches of it (5 to 7.6 cm.) can be pulled down without risk into the abdomen. The right vagus is then readily identified by digital dissection behind the esophagus, where it lies buried in loose areolar tissue under cover of the right crus of the diaphragm. It is seized with long curved forceps as it lies over the surgeon's forefinger (Fig. 5*B*), and a lead hook is then passed around the lower part of the esophagus to facilitate manipulation of the latter during the subsequent steps of the operation. Two or 3 cm. of the nerve is excised between forceps, and both ends are tied with nylon.

Traction on the esophagus causes the anterior vagus to stand out clearly, and it is dealt with in a similar manner, care being taken to divide the communicating branch to the posterior vagus and the numerous tiny branches to the lower part of the esophagus and to the cardia (Fig. 6*A*). Finally, the esophagus and its entire surroundings are carefully explored with the finger to insure that no nerve branches have been missed. These stand out like taut strings in the loose connective tissue and are easily recognized. After complete hemostasis has been secured, the lead hook is removed and the esophagus allowed to resume its normal position. It is not necessary to suture the peritoneum in front of it, as the gap closes spontaneously as soon as traction ceases, and its edges unite rapidly.

The duodenum is next freed from adhesions and mobilized sufficiently for the ensuing partial pylorectomy. Stay sutures are passed through the upper and lower borders of the pylorus and serve as retractors during the remainder of the procedure. If carefully placed, they will also minimize hemorrhage by controlling the main pyloric vessels. The general abdominal cavity is then completely isolated with suitably placed packs and the pyloric sphincter divided (Fig. 6*B*). A diamond-shaped segment of the stomach and duodenum, together with an adequate portion of the pyloric ring, is removed with scissors introduced through this opening, bleeding points being picked up with mosquito hemostats as they arise and tied off subsequently. As much as possible of the scar tissue, together with any anterior ulcer and the redundant walls of any duodenal pouches, is excised during this maneuver (Fig. 7). There is often reflux of bile from the duodenum at this stage, which may require energetic use of the sucker

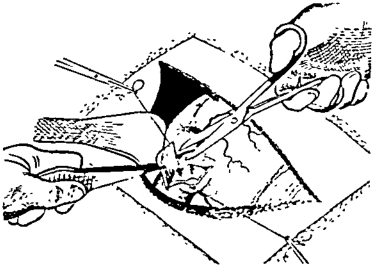

Fig. 7.—Excision of scar tissue and redundant walls of duodenal pouches.

to prevent contamination of the surrounding peritoneal cavity. It is then my custom to explore digitally the whole stomach and what can be reached of the duodenum through this opening in the bowel, to exclude any further pathologic change. Any posterior ulcers are next dealt with, by excision, currettage and oversewing, or by exclusion from the intestinal lumen.

The plastic closure of this gap in the bowel is carried out, as is shown in Figure 8, by two continuous intestinal sutures. The first, which is No. 000 chromic catgut, unites the whole thickness of the duodenum to the gastric mucosa; the second, of No. 00 braided nylon, again picks up the whole thickness of the duodenum and joins it to the muscular and peritoneal layers of the stomach. This forms an overlapping suture line, giving strength against possible leakage. A final insurance in this respect is achieved by covering the suture line with a turned-back flap of the great omentum, secured in position at each end by the stay sutures. Before the abdomen is closed, the new pyloric opening is tested for patency and size, and a last check is made of hemostasis at the site of vagotomy.

No special postoperative care is necessary in most cases, beyond the usual respiratory exercises advisable after any high abdominal incision. Some abdominal distention inevitably arises during the period of ileus, but the ensuing discomfort can usually be alleviated by enemas. Only if it is more protracted than normal is gastric suction required; intravenous therapy at this stage is almost never necessary, since the Levine tube has rarely to be left down for more than twenty-four hours. Early ambulation is the rule, patients getting up for the first time in the evening of the operative day and generally being fully ambulant three days later. They are discharged from the hospital on an absolutely normal diet, except that spirits and condiments are prohibited and smoking limited until after their first review three months later.

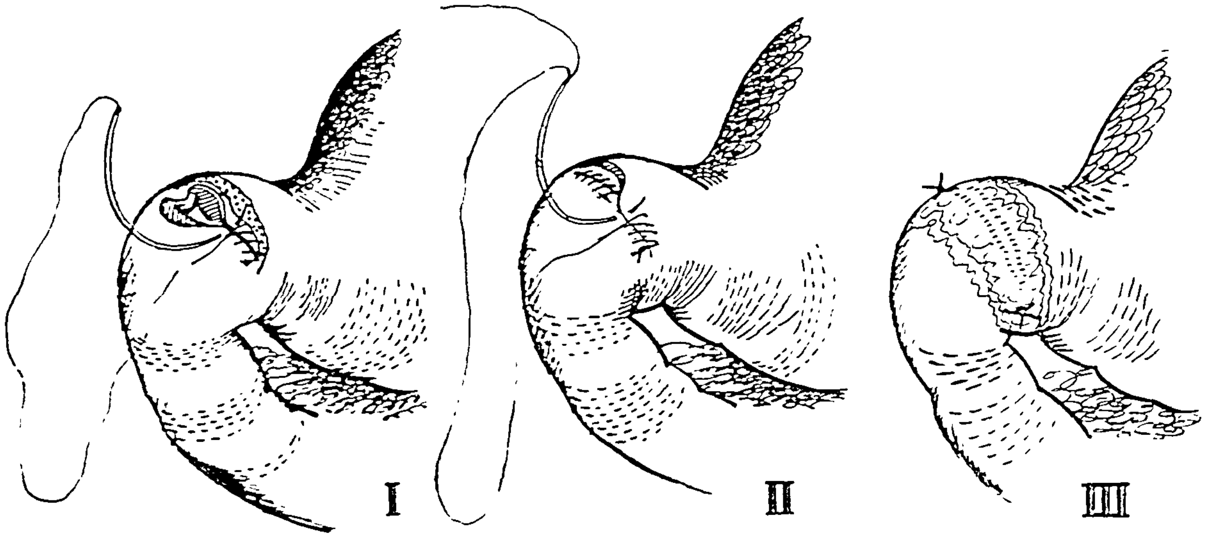

Fig. 8.—Plastic closure of aperture in bowel. Gap is closed with two continuous sutures: (I) duodenum united to gastric mucosa with No. 000 chromic catgut; and (II) duodenum joined to peritoneal layers of stomach with No. 00 braided nylon. III, suture line covered with turned-back flap of great omentum, secured at each end by stay sutures.

CONCLUSIONS

When vagotomy first appeared on the surgical horizon, it seemed the herald of a new era in the surgical treatment of ulcer; but it soon became obscured by distrust, from which it is only now emerging. As has happened to so many other valuable surgical advances the operation fell into disrepute through overenthusiasm for a new method of treatment and lack of technical experience. Many vagotomies were performed without any associated procedure to limit the effects of the subsequent retention of gastric contents, with correspondingly poor results. The cases in which it was employed were not screened adequately beforehand to exclude psychoneurotic patients, in whom results are notoriously bad after any type of gastric operation. Owing, moreover, to imperfect comprehension of the basic principles involved, vagotomy was sometimes even utilized as the sole surgical treatment for chronic gastric ulcer, in which it could not be of any logical benefit. I myself was an offender in this respect until I realized that it was a useless, even a dangerous, procedure for this condition.

Imperfect technic and the resulting incomplete vagotomy also produced a harvest of failures. Although this was understandable during the development of an operation of this type, there was certainly no justification for regarding these failures as poor end results of vagotomy. Without the criterion of a positive insulin test meal, of the type originally described by Hollander as a check on the completeness of neural section, no case ought to be placed in this category. Yet, all too frequently, the follow-up on such patients was inadequate and such investigations were omitted. It cannot be coincidence that the greatest proportion of failures in this operation have been reported from centers where it is performed relatively infrequently and where postoperative reviews are less critical.

It is most unfortunate that experimental methods of surgery, which can add so much to progress, cannot be confined during the early developmental stages to specialized centers with suitable research facilities and adequate resources of clinical material; and that the surgeons investigating them do not always possess the vision, critical analysis and lack of prejudice that are so necessary in scientific investigation. Had these conditions been met satisfactorily during the first few years of clinical trial of vagotomy, it would long ago have been recognized as the operation of choice for duodenal ulcer; instead of which, it is only now starting to take its true place as the excellent long-term results are gradually realized.

With regard to duodenal ulcer, there seems little doubt that the final solution to the problem lies in medical treatment. During the past few years there has been a great deal of research aimed at the development of suitable drugs to control the vagotonia which is the basic cause of this condition. Although none of these has, as yet, proved entirely effective, considerable strides have been made in this direction, and complete success would seem only to be a matter of time. Till then, however, the failure of medical treatment in some cases will continue to result in chronic ulceration, which can be dealt with successfully only by surgical means. Vagotomy, combined with some procedure to prevent the otherwise inevitable pylorospasm that follows it, is the ideal procedure.

Vagotomy if employed early enough, is also valuable in the treatment of intractable high ulcers of the lesser curvature and of secondary ulceration following inadequate gastrectomy or ill-judged gastro-

enterostomy. It has a place in the treatment of prolapse of the pyloric mucosa and is occasionally useful in other and even rarer conditions associated with abnormal gastric acidity. It cannot logically be employed, however, for chronic gastric ulcer or diseases of the large bowel.

SUMARIO

Quando a vagotomita foi inicialmente empregada, parecia constituir o arauto de nova era tratamento cirúrgico da úlcera; contudo, seu valor foi logo obsecurecido por uma desconfianca, da qual apenas agora ela se liberta.

Como tem acontecido com muitos pontos de progresso cirúrgico, esta operação caiu em descrédito devido ao excesso de entusiasmo por um novo método de tratamento e falta de experiência técnica. Muitas vagotomias foram feitas sem a associação a qualquer providência com o objetivo de limitar os efeitos da retenção subseqüente do conteúdo gástrico, com resultados conseqüentemente maus. Os casos em que a vagotomia foi empregada não foram prèviamente anal isados adequadamente, com o objectivo de excluir-se os pacientes psiconeuróticos, os quais apresentam notòriamente maus resultados após qualquer tipo de operação gástrica. Portanto, devido a u'a má comprezensão dos princípios básicos abrangidos, a vagotomia foi algumas vêzes mesmo utilizada como o único tratamento cirúrgico da úlcera gástrica crônica, sôbre a qual não poderia ter qualquer efeito benéfico lógico. O próprio autor confessa ter incorrido nesse êrro, até compreender a inutilidade e mesmo o perigo dessa orientação.

A técnica deficiente e a vagotomia conseqüentemente incompleta também acarretaram grande número de fracassos. Embora tal fato fôsse compreensível durante o desenvolvimento de uma operação dêsse tipo, não havia certamente justificação para considerar estas falhas como maus resultados da vagotomia. Sem o critério de uma refeição de prova insulinica positiva, do tipo originalmente descrito por Hollander, como prova da secção neural completa, caso algum deve ser colocado nesta categoria.

Com respeito à úlcera duodenal, parece haver poucas dúvidas de que a solução final do problema reside no tratamento clínico. Durante os últimos anos tem havido pesquiza intensa em busca de drogas adequadas para o contrôle da vagotomia que é a causa básica desta afecção. Embora nenhuma delas tenha ainda se revelado inteiramente eficaz, grande progresso foi feito nesse sentido e o sucesso completo parece ser apenas questão de tempo. Contudo, até que seja atingido êste objetivo, a falha do tratamento médico em alguns casos continuará resultando em ulceração crônica, que apenas poderá ser tratada com sucesso por meios cirúrgicos. A vagotomia, combinada com algum processo que evite o pilorospasmo conseqüente, é o processo de escolha.

A vagotomia, desde que empregada precocemente, é também de valor no tratamento das úlceras altas e incuráveis da pequena curvatura e da ulceração secundária à gastrectomia inadequada ou gastroenterostomia má orientada. Tem ainda indicação no tratamento do prolapso da mucosa pilórica, sendo ainda ocasionalmente útil em outras afecções mais raras, associadas a uma acidez gástrica anormal. Lògicamente não pode, contudo, ser empregada na úlcera gástrica crônica ou nas afecções do intestino grosso.

RIASSUNTO

Quando la vagotomia fece la sua prima comparsa sembrò che si schiudesse una nuova era nella cura dell'ulcera gastrica. Ben presto, tuttavia, perdette terreno, mentre ora sta riacquistandosi la fiducia dei chirurghi. Così come è accaduto per

tante altre innovazioni, l'intervento fu svalorizzato perchè usato con scarsa esperienza tecnica: le vagotomie venivano fatte senza gli accorgimenti necessari per evitare il ristagno gastrico, e i risultati erano cattivi; inoltre non venivano scartati i soggetti psiconeurotici, nei quali i risultati sono sempre scadenti, con qualunque tipo di intervento. La scarsa conoscenza delle basi fisiologiche del metodo faceva sì che esso venisse applicato come unico provvedimento nella cura delle ulcere gastriche croniche, nelle quali logicamente non poteva portare alcun vantaggio. Io stesso commisi questo errore fino al giorno in cui mi accorsi che era, più che inutile, pericoloso.

Anche una tecnica non corretta e quindi una sezione incompleta dei vaghi conduce all'insuccesso. Questi casi vengono dimostrati col test all'insulina di Hollander.

Per quanto si riferisce alle ulcere duodenali, la soluzione del problema sembra riposta nelle cure mediche. In questi ultimi anni si sono avute numerose ricerche tendenti a trovare un farmaco capace di controllare la vagotonia che è la causa principale dell'affezione.

Nessuna di queste sostanze si è dimostrata, ancora, del tutto efficace, tuttavia sembra che la soluzione del problema non debba essere lontana. Per ora, quindi, gli insuccessi della terapia medica devono far decidere per l'intervento. Il metodo ideale è rappresentato dalla vagotomia associata a un qualunque artificio per combattere l'inevitabile pilorospasmo.

La vagotomia, se eseguita abbastanza precocemente, è anche di grande utilità nella cura delle ulcere alte della piccola curva, e di quelle consecutive a resezioni insufficienti o a gastroenterostomia. Trova applicazione anche nella cura dei prolassi di mucosa pilorica e, più raramente, di altre affezioni consecutive ad iperacidità gastrica. Non la si deve usare, ben inteso, per le ulceri gastriche croniche nè per le malattie del grosso intestino.

RESUMEN

Cuando apareció por primera vez la vagotomía en el horizonte quirúrgico, pareció el heraldo de una nueva era en el tratamiento quirúrgico de la úcera; sin embargo, pronto se obscureció por la desconfienza que persiste actualmente. Como ha sucedido a tantos otros valiosos avances quirúrgicos dicha operación cayó en el desprestigio por el exceso de entusiasmo en un nuevo método de tratamiento y por falta de experiencia técnica. Muchas vagotomías han sido realizadas sin los procedimientos adecuados para limitar los efectos de la retención consiguiente de contenido gástrico con los malos resultados que eran de esperarse. Los casos en los cuales se empleo no fueron seleccionados adecuadamente para excluír pacientes psiconeuróticos, en los cuales los resultados son notoriamente malos después de cualquier tipo de cirugía gástrica. Por lo tanto, debido a la imperfecta comprensión de sus principios básicos, la vagotomía ha sido utilizada algunas veces como tratamiento quirúrgico aislado de la úlcera gástrica crónica, en la cual no podría ser de ningún beneficio lógico. Yo mismo la practiqué en este sentido hasta que me di cuenta de su inutilidad y aún peligro en este padecimiento.

Las imperfecciones técnicas [illegible] en vagotomías incompletas [illegible] también fracasos aun cuando [illegible] fácil de comprobar durante [illegible] de una operación de este tipo [illegible] ciertamente [illegible]ficación en [illegible] estos fracasos [illegible] los malos [illegible] la vagotomía. No debe [illegible] gún [illegible] su categoría [illegible] obtenido [illegible] una prueba [illegible] positiva [illegible] tipo de [illegible] preliminar para [illegible] [illegible]e [illegible]le [illegible]ez [illegible]te- [illegible]ite [illegible]ción

parece existir duda de que la solución final al problema reside en el tratamiento médico. Durante los últimos años ha habido una investigación considerable con el objeto de desarrollar las drogas adecuadas para controlar la vagotonia, que se considera la causa básica de este padecimiento. Aun cuando ninguna de éstas ha probado ser completamente efectiva se han logrado muchos avances y se considera únicamente cosa de tiempo el éxito completo. Sin embargo el fracaso del tratamiento médico en algunos casos producirá una úlcera crónica que únicamente puede tratarse con éxito por medios quirúrgicos, considerándose el procedimiento ideal la vagotomía combinada con alguna otra operación para prevenir el píloroespasmo y sus efectos.

Si se emplea suficientemente precoz la vagotomía, es un recurso útil en el tratamiento de las úlceras altas de la curvatura menor y de las úlceras secundarias consecutivas a gastrectomías inadecuadas o gastroenteroanastomosis. Así mismo tiene un lugar en el tratamiento del prolapso de la mucosa pilórica y ocasionalmente es útil en otros padecimientos raros asociados con acidez gástrica anormal. Lógicamente no puede emplearse para la úlcera gástrica crónica o para los padecimientos del intestino grueso.

ZUSAMMENFASSUNG

Die Vagotomie schien bei ihrem ersten Auftauchen am Horizont der Chirurgie ein neues Zeitalter der chirurgischen Behandlung der Geschwürskrankheit anzukünden; bald aber folgte eine Periode der Enttäuschung und des Misstrauens, von der das Verfahren erst neuerdings zu erholen beginnt. Wie viele andere wertvolle chirurgische Neuerungen verdankt auch die Vagotomie ihren schlechten Ruf der übtertriebenen Begeisterung, die einem neuen Verfahren anfänglich entgegengebracht wird, und dem Mangel an technischer Erfahrung. Viele Vagotomien wurden ausgeführt, ohne dass Massnahmen zur Ausschaltung der später folgenden Stauung des Mageninhalts getroffen wurden, und die Resultate waren dementsprechend kümmerlich. Ferner waren die Fälle vor der Operation nicht genügend gesiebt, um Psychoneurotiker auszuschliessen, bei denen die Ergebnisse aller Formen der Magenoperation bekanntermassen schlecht sind. Manchmal wurde sogar infolge mangelhaften Verständnisses der grundlegenden Prinzipien des Verfahrens die Vagotomie als einziger chirurgischer Eingriff zur Behandlung eines chronischen Magengeschwürs angewandt, wo logischerweise ein günstiger Einfluss garnicht erwartet werden konnte. Der Verfasser gibt zu, in dieser Richtung selbst Verstösse begangen zu haben, bis er erkannte, dass die Operation für diese Erkrankung ein nutzloses und sogar gefährliches Verfahren darstellt.

Eine weitere Fülle von Versagern ist auf unzureichende Technik und die daraus resultierende unvollständige Resektion des Vagus zurückzuführen. Das alles lässt sich zwar während des Entwicklungsstadiums einer derartigen Operation verstehen, berechtigt aber keineswegs dazu, die Misserfolge der Vagotomie als solcher in die Schuhe zu schieben. Kein Fall darf als Versager der Vagotomie klassifizziert werden, der nicht einen positiven Ausfall des Insulinversuchs nach Probemahlzeit, wie ursprünglich von Hollander als Nachweis vollständiger Resektion des Nerven angegeben, gezeigt hat.

Was das Zwölffingerdarmgeschwür betrifft, so besteht kaum ein Zweifel, dass die endgültige Lösung des Problems in der medizinischen Behandlung liegt. In den letzten Jahren hat sich ein grosser Teil der medizinischen Forschung mit der Entwicklung von Medikamenten beschäftigt, die sich zur Beeinflussung der Vagotonie, die die letzte Ursache der Erkrankung darstellt, eignen. Wenn sich auch

bis jetzt keines dieser Mittel als völlig zufriedenstellend erwiesen hat, so sind doch in dieser Richtung beträchtliche Fortschritte zu verzeichnen, und der endgültige Erfolg scheint nur noche eine Frage der Zeit zu sein. Vorläfig aber sind die Versager medikamentöser Behandlung noch immer für das Entstehen chronischer Geschwüre, die nur chirurgisch mit Erfolg behandelt werden können, verantwortlich. Hier ist die Vagotomie in Verbindung mit irgendwelchen Massnahmen zur Vorbeugung des sonst unfehlbar folgenden Pylorospasmus das ideale Verfahren.

Ferner ist die Vagotomie, wenn sie rechtzeitig ausgeführt wird, von Wert in der Behandlung unbeeinflussbarer hoch gelegener Geschwüre der kleinen Kurvatur und sekundärer Geschwüre, die nach unzureichenden Magenresektionen oder schlecht geplanten Gastroenterostomien auftreten. Auch in der Behandlung des Prolapses der Schleimhaut des Pylorus und gelegentlich bei anderen noch selteneren mit unnormaler Magensäure einhergehenden Erkrankungen Fällt der Vagotomie eine Rolle zu. Für ihre Anwendung bei chronischen Magengeschwüren oder bei Erkrankungen des Dickdarms jedoch gibt es keine logische Rechtfertigung.

RÉSUMÉ

Au début, la vagotomie semblait annoncer une ère nouvelle dans le traitement de l'ulcère; mais elle fut bientôt (et jusqu'à récemment encore) considérée avec méfiance. Comme on l'a souvent constaté pour tant d'autres progrès chirurgicaus de valeur, cette opération est tombée en disgrâce par suite d'un premier enthousiasme excessif à l'égard d'une méthode nouvelle, et par manque d'expérience technique. Un grand nombre de vagotomies ont été effecturées sans l'aide d'aucun procédé visant à limiter les effets secondaires de rétention du contenu gastrique, et les résultats furent mauvais. Les cas dans lesquels elle était pratiquée n'ont pas été suffisamment examinés en vue d'exclure les malades psychiatriques, chez lesquels les résultats sont notoirement mauvais après n'importe quel type d'opération gastrique. La vagotomie était même parfois utilisée comme seul traitement chirurgical de l'ulcère gastrique, dans lequel elle ne pouvait logiquement provoquer aucune amélioration. J'ai moimême commis des erreurs semblables, jusqu'au jour où j'ai réalisé que c'était un procédé inutile, voire dangereux dans ce genre de cas.

La technique imparfaite de la vagotomie a également provoqué une avalanche d'echecs qui ne justifiaient en rien les mauvais résultats finaux de cette opération. Aucun cas ne devrait être classé dans cette catégorie sans le critère d'un repas test à l'insuline postif, tu type décrit à l'origine par Hollander, prouvant que la section nerveuse a été complète.

En ce qui concerne l'ulcère duodénal, il semble bien que la solution définitive soit le traitement médical. Un grand nombre de recherches ont été faites au cours de ces dernières années en vue de perfectionner les médications propres à contrôler la vagotonie qui est à la base de cet état. Bien qu'auncune de ces médications ne se soit encore montrée absolument efficace, les progrès réalisés sont grands et le succès final semble n'être plus qu'une question de temps. Jusque là, cependant, l'échec du traitement médical provoquera dans certains cas une ucération chronique, que seuls les moyens chirurgicaux peuvent guérir. La vagotomie, combinée avec une technique visant à empêcher l''inévitable pylorospasme qui s'ensuit sans cela, est le procédé idéal.

La vagotomie, si elle est pratiquée assez tôt, est également précieuse dans le traitement des ulcères haut situés de la petite courbure et de l'ulcère peptique après gastrectomie ou gastroentérostomie inopportune. Elle a sa place dans le traitement du prolapsus de la muqueuse pylorique, et elle est a l'occasion utile dans d'autres états plus rares encore, associes avec une acidité gastrique pathologique. Elle ne peut cependant pas être utilement pratiquée pour l'ulcère gastrique chronique ou pour les affections du gros intestin.

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Habit is a cable; we weave a thread of it every day, and at last we cannot break it.

—*Horace Mann*

We are never so ridiculous from the habits we have as from those we affect to have.

—*La Rochefoucauld*

Nothing so needs reforming as other people's habits.

—*Mark Twain*

The secret of managing a man is to let him have his way in little things. He will change his life when he won't change his bootmaker.

—*John Oliver Hobbs*

New Therapeutic Agents for Treatment of Carcinoma of the Pelvis

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THERE is a saying that "there is nothing new under the sun." There is some truth in this, for irradiation in some form and/or surgical intervention are still the principal weapons against pelvic cancer. The most productive advance has been in the publicity that has made the public more cancer-conscious and more alert to seek medical advice, with the result that the proportionate incidence of patients with cancer still in the curable stage has steadily increased. Likewise, better supportive measures have made everyday performances of surgical procedures that were formerly considered miracles. Similarly, precision irradiation has made it possible to use methods that deliver increasingly greater and therefore more lethal doses to the cancer. While surgical advances have not been without a rather high mortality rate and serious as well as annoying complications, increased doses of irradiation have also resulted in increased damage to normal tissues. Operation for cancer of the cervix was almost completely abandoned from 1920 to 1940 in favor of irradiation, largely because adequate operation resulted in so high an operative mortality rate that its advocates were influenced by the lower mortality rate associated with irradiation, and with irradiation's equal or better results. Better knowledge of preoperative and postoperative management has made more nearly adequate operation available. Time alone will decide whether this is the superior method of attack. Stone[1] recommended a "golden mean" between ultraradicalism on the one hand and the lack of courage and skill and the fear of innovation on the other. He warned surgeons that they must study carefully the limitations as well as the possibilities of the new ultraradicalism before deciding its proper place and the extent of its usefulness. This is being attempted in at least one clinic, where all cases are unselected and all patients are treated surgically. Except for overall figures, however, the percentage results are not comparable with most results of irradiation, because of the difference of stage classification, preoperatively or postoperatively. Also, few clinics have unselected cases all treated by a given method.

In spite of the popular trend toward radical operation, irradiation has made definite advances. In general these have been due to precision irradiation and the increased concern with the accuracy of estimation of the dose delivered to the tumor rather than of the dose applied in air. The story of the advance in irradiation has been largely concerned with the adoption of methods that will increase the doses delivered to the tumor.

Scattered reports reveal some attempts at systematic methods of attack, possibly encouraged by partial or palliative successes with the selective action of radioactive iodine in the [illegible]

Read at the Eighteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, New York, September 13-17, 1953.

Submitted for publication Nov 12, 1954.

of the thyroid. In general, the use of tracer substances for pelvic tumors has been largely experimental, and disappointing as a curative measure. Any recorded success has been measured mostly by comparison of length of life and degree of palliation.

What are the newer weapons utilized to combat cancer? First, the improved publicity that has made the lay public more conscious of the warning symptoms that stimulate many, especially women, to seek medical advice earlier, or has impressed the public with the necessity for periodic checkups by conscientious physicians. These checkups need not be endowed or government-supported through so-called cancer prevention clinics. They can be performed by any qualified cancer-minded physician. Cancer prevention clinics have, by their own reports, been somewhat disappointing in their low incidence of actual detection of cancer, and, if made a part of a hospital instead of a public health program (where they really belong), their greatest influence has been by their low contract charges increasing the rates for the really sick patient for such items as smears, roentgenograms, biopsies, etc. Economically, I doubt whether such clinics are worth while except to spread the gospel of cancer consciousness. When one considers that in spite of all the present-day publicity, Scheffey[2] has shown that only 28.3 per cent of all cancer patients benefited by no delay from the time of the first symptom to the time of the first treatment, and that doctors even today are solely, or in combination with the patient, responsible for 33 per cent of delayed therapy, it would seem that more emphasis on the education of doctors could be stressed.

Second: What advances are being made toward discovering the cause of cancer? The mention of certain theorems seems appropriate: Craver[3] has cited Ewing as saying of cancer, "It is not one disease but a thousand different diseases." In spite of this and other similar observations there is still the urge to discover an overall formula that contains a component, the lack or the excess of which spells cancer. Scheele[4] has said, "The purpose of studying cancer etiology is no longer to find the cause but to explain the origin." With this in mind, he points out that nucleic acid is the active principle of cancer virus. Now in plants both bacteria and viruses have caused neoplasms to develop, but in man no such phenomenon has been demonstrated. Rhoads[5] expressed the opinion that "at present to eliminate cancer reproduction is more feasible than to remove cancer production"; also that the difference between normal and neoplastic cells resides in nucleic acid. Since folic acid deficiency inhibits leukocyte formation, the utilization of folic acid antagonists seems reasonable in an attempt to check cancer. Yet Rhoads[6] and Suguira failed to corroborate the fact that "Teropterin" inhibits transplanted sarcoma. Nitrogen mustards have a harmful effect on the pathologic leukocytes of leukemia as well as on normal leukocytes. In the rat, normal cells are more sensitive to antifolic acid substances than are tumor cells. Rhoads[6] further stated, "it is apparent from the statistics that no millennium of cancer chemotherapy has been attained by the use of any antifolic acid material so far described." Since the submission of this paper, Rhoads[7] has described successes with the addition of synthetized 6-mercaptopurine or Purinethiol to A-methropterin and cortisone for the transient control of acute leukemia in children and adults. Hodgkin's disease, lymphoid and other neoplasms, however, failed to respond to this therapy. Rhoads[5] credited Ewing with having been the first to recognize the possibility that abnormality of the endocrine system might provide a favorable environment for the development and growth of cancer cells. This has led to the moot point as to whether women of menstrual age with cancer of the breast should be castrated. Castration has certainly had little effect on cancer of the pelvic organs, with the possible exception of apparent but still not authenticated improvement by removal of the primary tumor in cases of cancer of the ovary with metastases. Investigations involving the steroids are still being pursued, but the search for the unknown factor or antagonist for the control of cancer is as yet unrewarded.

The third factor is the surgical advance. As has been stated, the improvements in surgical approach have been due mainly to an increased perception of preoperative and postoperative physiologic and supportive measures. With the acquired knowledge of the necessity of maintaining electrolyte balance, replacing blood, supplying vitamin needs and using antibiotics and sulfonamides, together with improved methods of anesthesia, procedures formerly considered "mayhem" or "surgical calisthenics" have become everyday accomplishments. Such procedures should be undertaken, however, only by qualified gynecologic surgeons in hospitals equipped to handle the serious as well as the annoying complications. The high incidence of damage to the urinary tract and the intestines caused by such operations is well known. Sherman[8] has emphasized that a late complication of bilateral ureterosigmoidostomy is hyperchloremic acidosis, which, if not corrected by control of the electrolyte balance with adequate rectal-urinary reservoir drainage, results in osteomalacia.

The fourth point in the recent advance is irradiation. Advances in irradiation have consisted of delivering larger and more accurately measured doses to the tumor-bearing area. The methods have included increased intensity; increased filtration to eliminate the caustic rays; divided doses to permit recovery of skin and other normal tissue, and to repeatedly attack cell divisions of the tumor cells; rotation of the portals of approach; rotation of the patient; interstitial application; the intra-arterial approaches, and the use of radioactive isotopes.

Roentgen Therapy: Caldwell[9] first described the transvaginal cone application of roentgen therapy in 1902. Merritt[10] in 1921 revived interest in the method and reported results[11] in 1939. Caulk[12] modified the approach by the use of a plastic-ended cone that permits irradiation of a larger field *per vaginam* than did the metal cone previously used. The response to the desire for increased depth doses has resulted in increased target distances and increased voltages from 250 to 400 to 1,000 kilovolt machines. The desire for increase in intensity has also led to the cyclotron and now the betatron, which can develop 300 M.E.V. Recently the Atomic Energy Commission has announced cash payment to a civilian[13] for the patented principle behind a 100,000 M.E.V. atom smasher which the Commission proposes to build. These machines have the advantage that the depth dose has less scatter and therefore can be localized better; also, the intensity is increased with the depth. Although the cyclotron and the betatron have been used for treating patients, the cost is generally considered prohibitive, and these larger and larger sources of energy are used chiefly as reactors.

Precision Irradiation: It is now realized that methods using standardized doses for all patients with pelvic cancer are inaccurate and inadequate. Each patient must be individualized as to method of application and as to tumor dosage. Corscaden,[14] Payne,[15] Fletcher,[16] Lewis[15] and others have devised different methods by which, with the [illegible] by the roentgen ray, the actual doses at various points of the pelvis can be estimated.

A 50-Gm. radium element pack recently installed at the Janeway Clinic of Roosevelt Hospital, New York, has 20 separate radium sources of 2.5 Gm. each, so distributed that by the resulting multiple portals an increased tumor dose can be accurately delivered from the converging beams to a focal tumor point, with decreased damage to skin and normal tissues.

Most of these applicators are modifications of those used by Regaud in Paris at the Curie Institute, by Heyman at the Radiumhemmet, the Manchester colpostat or the Bailey-Healy bomb from Memorial Hospital in New York. All modifications have attempted a more efficient and accurate distribution of the radiation to the pelvic tumor-bearing area, at a lower intensity *for a longer period,* and with increased filtration. Waterman[17] and Nolan[18] have advocated interstitial radium therapy, claiming a wide and fairly uniform distribution in and about the tumor, and they demonstrate an individualization of treatment. Barnes[19] used a plastic template and aluminum needles loaded with cobalt 60 seeds. The measurements are calculated by roentgen studies in which slightly different methods of calculation are used. All plans are for increased accuracy and more even distribution of measured tumor doses.

Radioactive Isotopes: According to Lawrence,[20] "the nature of radioactive isotopes is such that it differs from its sisters only that it emits radiation and has a different atomic weight. Chemically it is no different." Delario[21] has reviewed the methods used for separating the heavier from the lighter isotopes. Today the elements and their isotopes number about 850. While there are some natural radioactive isotopes, most are formed artificially. Joliet and Irene Joliet-Curie produced the first artificial radioactivity by bombarding aluminum with alpha particles from radium. Radium as a source of energy is still sometimes used. Today, however, most radioactive substances are made by bombarding matter with atomic particles energized to high potentials by means of the cyclotron or the betatron or by the highly energized neutrons in the atomic pile. The relatively expensive but highly versatile cyclotron can use deuterons, neutrons, alpha particles and protons as bombarding particles. The atomic pile makes use of neutrons only.

As was so clearly stated by Aebersold,[22] the methods of application of radioactive isotopes produced with the uranium chain reactor are divided for specific uses into those dependent on physical placement of radioactivity and those dependent on chemical placement. The physical placements are, in general, those based on the use of gamma radiation, whereas the chemical placements are more often those utilizing beta radiation. Many factors should be considered in the selection of the most suitable available reactor-produced radioactive isotope. The most important of these factors are: 1. The method of production. 2. Half-life. 3. The type and energy of the radiation. 4. The suitability of the selected radioactive isotope to the nature of the proposed use.

The physical placements may use radioactivity from (1) external sources; (2) interstitial sources (such as gamma ray sutures, needles, infiltrating colloids), or (3) intracavitary sources (such as gamma ray applicators or colloid infusions). The chemical placements may use (1) colloid deposition (radioactive gold for the reticuloendothelial system); (2) selective absorption (radioactive iodine for the thyroid gland), or (3) *differential turnover* (radioactive phosphorus for the hematopoietic system).

Gold 198 emits both beta and gamma

rays, but most of the therapeutic irradiation arises from the beta rays. Cobalt 60 emits a beta ray of relatively low intensity that can be easily screened out, resulting in a practically pure gamma ray emission. Phosphorus 32 has been selected for use in the hematopoietic system but has not been considered applicable to pelvic tumors.

Barnes[19] has clearly compared the characteristics of gold 198 with those of cobalt 60, as follows:

Half-life: Cobalt 60, five and three-tenths years; gold 198, two and seven-tenths days.

Economy: Cobalt presents fewer problems of transportation and dosage and can be "warmed up" in the reactor. Activation in quantities is less expensive for cobalt 60 than for gold 198.

Types of radiation emitted: Cobalt 60 has a homogeneous gamma radiation of only two gamma rays; the beta radiation is extremely weak and can be screened out easily, whereas gold 198 has a single gamma radiation much weaker than its relatively strong beta radiation.

Gold makes an easily handled colloid.

With these characteristics in mind, the most suitable radioactive isotope is selected for use in applicators designed for the most efficient placement in the individual situation. It follows that colloidal gold 198 should be selected for injections into the cavities of the peritoneum and of the thorax. The colloid mixes well with the ascitic fluid or with that of pleural effusions, but is deposited unevenly on the walls of the cavity. The half-life is short, and the gold is phagocyted in large part. Used intravenously, colloidal gold will deposit in the reticuloendothelial system not because it is gold or radioactive, but because it is a colloid. The size of the colloid will decide whether most of it will be deposited in the spleen or in the liver. Friedell,[23] Sherman,[24] Andrews,[25] and Knisely[26] and others have reported short-time observations. Some reduction in ascites has been noted, but no reduction in the size of the tumor masses. This is probably due to inability to deliver cancerocidal doses to the tumor or to obtain uniform distribution. Nolan[27] has recently described the injection of colloidal gold into the parametrium in the hope that phagocyted colloid would be carried via the lymph channels and lodge in the lymph nodes. The colloid was mixed with 1 per cent pectin solution to get the proper dilution. It has been shown that colloidal gold will reach normal nodes but will not concentrate in cancerocidal doses in cancer-dominated nodes, probably because of the lymphatic blockage to such nodes. Injection of colloids under the mucosa of the cervix rather than into the parametrium has been tried with some success, but with questionable distribution. Experimentally, "coverage" of the gold colloid with silver has seemed to aid in the migration via the lymphatics to the nodes. It is too early to evaluate results.

Cobalt: Morton[28] and Barnes[19] reported on the use of radioactive cobalt 60 as (1) cylinders, (2) multiple small sources placed in the uterine cavity, (3) interstitial needles threaded through a lucite template, and (4) a flexible nylon tubing sewed into lymph nodes and along the lateral pelvic wall in patterns that give accurate distribution. Cobalt 60, with proper applicators, can be used wherever radium or the roentgen ray has been used, and probably more economically. A cobalt pack is replacing a 1,000 kilovolt roentgen machine in at least one clinic because a greater intensity can be delivered at a lower cost.

All of these procedures are relatively new and too recent for a fair
of their merit.

Hormonal or
Rawson[29] has

the fifteen years in the laboratories and clinics on the relationship of hormones to the development of tumors or to the inhibition of certain metastatic neoplasms make it possible to now foster a real hope for eventual control of this disease by physiologic means." The means attempted have consisted of changing the hormonal or physiologic environment by adding or subtracting hormones, thus disturbing an existing balance, or of attempting to restore a normal hormone balance. Creation of tumors or inhibition of growth by such methods in animals has seldom been accomplished in man. However, such methods as a thyroidectomy, thyroid therapy, castration, bilateral adrenalectomy and the administration of estrogens, androgens, cortisone and ACTH have been encouraging with certain types of tumors in man as well as in animals. The most striking results have been obtained with tumors of the breast, prostate or testes, and especially bone or soft tissue metastases. There have been no lasting benefits, however, and cessation of therapy has been followed by prompt recurrence. Strangely enough, hormonal therapy has had little effect on tumors of the female genital tract. Even the endometrial hyperplasia produced in postmenopausal women by estrogens is reversible to endometrial atrophy on the cessation of therapy.

It has been shown[30] that, in cases of cancer of the thyroid, total ablation of the thyroid results in previously nonfunctioning metastatic lesions assuming the function of normal thyroid tissue, i.e., concentrating radioactive iodine. Evidence pointing to the possible influence of hormones on pelvic tumors is based largely on impressions.

Bilateral oophorectomy performed for cancer of the ovary with peritoneal metastases has been followed by a temporary regression of the metastatic lesions. Possibly the temporary regression is due to the gradual taking over of ovarian function by the adrenal glands. West[31] stated that bilateral adrenalectomy has not been curative in any of his cases. Gardiner,[32] Allen[33] and their co-workers have reported the occurrence of transplantable metastasizing cancers of the cervix in mice after prolonged estrogen therapy. Lipshutz[34] also reported growth of fibroids and endometrial polyps after administration of estrogens. He later reported[35] that simultaneous administration of testosterone or progesterone with the estrogen prevents tumor formation. These data, however, all concern experimented animals. Dockerty,[36] Mussey[37] and Smith[38] observed a high incidence of cancer of the endometrium in patients with granulosa cell tumors of the ovary. Smith[39] also reported a hyperplasia of the cortical stroma in 80 per cent of his postmenopausal patients with endometrial cancer. From a study now in progress at Memorial Center, as cited by Rawson[29], it appears that in cases of metastatic cancer of the breast a combination of roentgen and hormonal therapy is more effective in promoting healing of osseous and soft tissue lesions than is either roentgen or hormonal treatment alone.

Intravenous Progesterone: In 1951 Hertz[40] reported histologic changes in squamous cell cancer of the cervix after massive dosages of progesterone. Rothchild[41] devised a simple method for intravenous administration. Barnes,[42] giving up to 500 mg. a day intravenously, noted that the results of biopsy had turned negative in 25 per cent of cases, and in 33.3 per cent the smears were reversed. In each case the negative result was temporary. Neither Barnes nor Hertz cured any patient by this method. Taylor[43] has reported that at the Francis Delafield Hospital enormous doses of progesterone have been administered to several patients with cervical cancer. No change has been observed in the clinical extent of the disease or in the histologic character of biopsy specimens of the malignant tissue taken during the course of therapy.

In spite of the evidence, therefore, there is no conclusive proof that cancer of the pelvic organs has permanently been favorably affected by estrogens, androgens, cortisone, ACTH or adrenalectomy.

The Grahams[14] reported an alteration of the basal cells in smears of the vaginal mucosa after irradiation. The changes occur in nonmalignant as well as in malignant components. In their opinion, as far as prognosis is concerned, the sensitivity of the host to irradiation is as important as the sensitivity of the tumor, or more so; and also that a determining factor in the cure of cancer is the susceptibility of the host to irradiation. If the cellular reactions of the host are studied after trial exposure, the patients who will be radioresistant and will do poorly if treated by irradiation can be recognized. The Grahams have also found that progesterone, adrenal cortical extract and testosterone influence sensitivity to radiation, as detected by cellular changes in the smears.

Nitrogen Mustard: Barnes[10] has stated that Cromer and Klopp have reported on a series of patients with cancer of the cervix treated by intra-arterial administration of nitrogen mustard. Barnes also treated 20 patients in this manner. If nitrogen mustard is injected into a vein, it reaches the bone marrow and the pulmonary system. If injected into the arterial system, most of it will go into the first epithelial surface it passes on being distributed through the capillary bed. Since the arterial system supplying the pelvic organs is relatively localized and readily accessible, the possibilities of nitrogen mustard are evident to the gynecologist. It produces the same cellular picture as does irradiation and should not be used in a patient already at the level of radiation tolerance. No report was found of a synergistic effect with irradiation, but it would seem that nitrogen mustard might lend itself as a supplement to irradiation when a lethal dose of irradiation could not be delivered. Its success has been measured by decreased ascites and increased well-being. It is not without its toxic symptoms, however, such as nausea, vomiting, weakness, tremor and even convulsions. The blood count is not affected. The utilized vessel is inflamed, and thrombosis may occur. The so-called successes are temporary.

SUMMARY

New therapeutic agents for treating cancer of the pelvic organs are reviewed. Most are modifications of old methods, characterized by an attempt at more radical removal of larger drainage zones around the primary tumor or delivery of larger dosages of lethal "medicine" to cancer-bearing areas. The new methods are discussed. They are not without complications, not without disappointments, for most have been rewarded only by temporary or palliative results. These experimental methods are not without merit, however, for they confirm or disprove the thinking philosophy of a group of serious-minded men. Who knows what degree of mental stimulation will be required to achieve success in the fight against cancer?

ZUSAMMENFASSUNG

Neue Verfahren der Behandlung des Krebses der Beckenorgane werden besprochen. Meist handelt es sich um Modifikationen alter Methoden mit dem Ziel einer radikaleren Beseitigung groesserer Drainierungsgebiete in der Umgebung der Primaergeschwulst oder der Verabreichung groesserer Dosen des krebszerstoer-

enden Mittels auf die erkrankten Gebiete. Die neuen Verfahren werden eroertert. Es fehlt nicht an Komplikationen und an Enttaeuschungen; denn die meisten tragen nur zeitweilige oder palliative Erfolge davon. Trotzdem haben diese experimentellen Methoden ihre Verdienste insofern sie die theoretischen Ueberlegungen einer Gruppe ernsthafter Forscher entweder bestaetigen oder widerlegen. Es ist nicht vorauszusehen wieviel geistige Anregung noch erforderlich sein wird, bis der Kampf gegen den Krebs von Erfolg gekroent ist.

RIASSUNTO

Vengono passati in rassegna i nuovi mezzi di cura del cancro degli organi pelvici. Molti di essi non sono che vecchi metodi modificati, coi quali si cerca di asportare il più radicalmente possibile tutte le vie linfatiche che circondano il tumore oppure si tenta di somministrare dosi più energiche di sostanze anticancerose. Questi nuovi metodi non sono senza pericoli nè senza insuccessi; molti di essi sono stati seguiti solo da risultati temporanei o palliativi. Tuttavia non sono senza merito dacchè portano alla conferma o al rifiuto di teorie e di ipotesi logiche. Non si può immaginare quale sforzo mentale richiederà la vittoria sui tumori maligni.

RÉSUMÉ

De nouveaux agents thérapeutiques pour le traitement du cancer des organes pelviens sont passés en revue. La plupart sont des módifications d'anciennes méthodes caractérisées par un essai d'ablation plus radicale. Les nouvelles méthodes sont discutées. Elles ne sont pas sans complications sans déceptions, car la plupart n'ont apporté que des résultats temporaires ou palliatifs. Ces méthodes expérimentales ne sont pourtant pas sans mérite, car elles confirment ou infirment la manière de penser de certains savants.

SUMARIO

São revistos os novos agentes terapêuticos para o tratamento do câncer dos órgãos pélvicos. Na maioria dos casos tratase de modificações de métodos antigos, com tentativas de extirpação mais radical ou de maiores zonas de drenagem em tôrno do tumor primário ou o emprêgo de maiores doses de "remédios" letais em relação às áreas portadoras de câncer. Os novos métodos são discutidos; não são desprovidos de complicações e nem desapontamentos pois a maioria dêles traz apenas resultados temporários ou paliativos. Tais métodos experimentais têm mérito, contudo, pois confirmam ou negam a filosofia de pensamento de um grupo de pesquisadores. Quem sabe que grau de estímulo mental é necessário para alcançar o sucesso na luta contra o câncer?

RESUMEN

Se revisan los nuevos agentes terapeúticos en el tratamiento del cáncer de los órganos pélvicos. La mayoría son modificaciones de métodos antiguos. caracterizados por el intento de hacer extirpaciones más radicales de zonas mayores de drenaje circundantes al tumor primario o por el proporcionamiento de dosis mayores de "medicina letal" a las zonas cancerosas. Se discuten los nuevos métodos, que no estań excentos de complicaciones ni desilusiones, ya que la mayoría proporcionan únicamente resultados temporales o paliativos. Sin embargo estos métodos experimentales no están excentos de mérito ya que confirman o desaprueban la filosofía de un grupo de estudiosos. ¿Quién conoce el grado de estimulación mental que se requiere para logar con éxito una batalla contra el cáncer?

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Provided a man is not mad, he can be cured of every folly but vanity.
—*Rousseau*

You've no idea what a poor opinion I have of myself, and how little I deserve it.
—*Gilbert*

Osgood-Schlatter's Disease in the Army

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IN 1903 Dr. Robert Osgood,[*] at that time a Junior Associate of Dr. Goldthwaite, published his classic paper on lesions of the tibial tubercle in the adolescent. In the same year Dr. Carl Schlatter published his on injuries of the beaked portion of the proximal tibial epiphysis (Verletzungen der oberen Tibiaepiphyse). Several years later, according to Dr. Osgood, a Japanese author wrote a monograph on the subject, naming it Osgood-Schlatter's disease. In 1934 Dr. Osgood was presented, in the presence of one of us, a copy of the Memoirs of Sir James Paget containing an article written by him about 1860 on avulsions of the tibial tubercle.

Recent medical reports on the subject, save for a few notable exceptions, have been based on small series or even single cases. During the past year we have had the opportunity to treat 30 patients with 39 lesions of the anterior tibial tubercle. Interest in obtaining this series was stimulated by the observation that local injections of procaine hydrochloride, with the needle introduced deep to the infrapatellar tendon, gave temporary relief of symptoms and by the idea that the symptoms might have been caused by infrapatellar bursitis rather than by the ossicles so apparent on roentgen examination. This study was undertaken in the hope of finding the best method of treatment for soldiers.

Clinical Picture.—The clinical picture of the disease as described by most authors is that of pain developing in the region of the anterior tibial tubercle and following some form of trauma to the knee. The pain is usually aching, and early in the course of the disease it occurs intermittently. Later it may become constant. It usually occurs in the male during the adolescent period, and immobilization results in cure. The clinical picture in our series, although similar, differs somewhat in that our patients were older, with an average age of 23 years and a spread from 12 to 36 years. Thirty-six per cent had no history of trauma. There were nine cases of bilateral involvement; in 8 of these the right knee was involved, and in 13 the left. Twenty-four per cent of the patients were Negro soldiers. The duration of symptoms varied from one week to ten years, with an average of four years. Twenty-eight patients stated that they had been made worse by military service. Thirteen of these claimed to have suffered pain only since entry on active duty. An additional 13 stated that pain had been present since their early teens. Two of these were teenage dependents of Army personnel who had typical symptoms of Osgood-Schlatter's disease. Roentgenograms showed no fracture of the anterior tibial tubercle or ossification within the tendon. Immobilization resulted in cure. The remaining 4 stated that the pain had begun when they were in the early twenties. A typical case history from our series is here presented.

REPORT OF CASE

A 20-year-old white man, whose chief complaint was of pain and aching in the right

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From the Orthopedic Section of the United States Army Hospital, Landstuhl, Germany.

[*] Personal communication from Dr. Osgood twenty years ago.

knee, stated that the pain had been present for approximately two years. He could remember no specific episode of trauma, but stated that after the physical training, marching and crawling required in the Army he began to have pain in the right knee. This persisted and caused him to seek medical advice. On admission he complained of aching in the knee on increased activity and pain in the tibial tubercle after crawling and kneeling.

The past medical history and the family history were noncontributory. A systemic review revealed no abnormality. On physical examination the observations were limited to the right knee (Figs. 1 and 2). There was considerable enlargement of the anterior tibial tubercle, with callus formation in the skin. Pressure over the tubercle caused pain. The patient had a full range of painless, noncrepitant knee motion. Roentgenograms revealed an ossicle within the infrapatellar tendon (Fig. 3). Laboratory data disclosed values within normal limits.

This patient was treated conservatively with local injections of procaine hydrochloride, immobilization and rest, without benefit. At operation the ossicle was removed from the infrapatellar tendon, and the patient was returned to duty three weeks later.

Etiologic Factors.—Most authors dealing with this disease have arrived at the conclusion that trauma is the most important etiologic factor. Meyer summarized the main theories as follows: (1) Developmental, (2) endocrine dyscrasia, (3) infections, and (4) injury. In our 30 cases body type and race played no part, as the condition was seen in all types. Endocrine dyscrasia was not in evidence, and rickets, which has been mentioned by some authors as a causative factor, was not present in either the history or the roentgenograms. Neither infection nor inflammation was present in the microscopic sections (Fig. 4). Seventeen of our patients (64

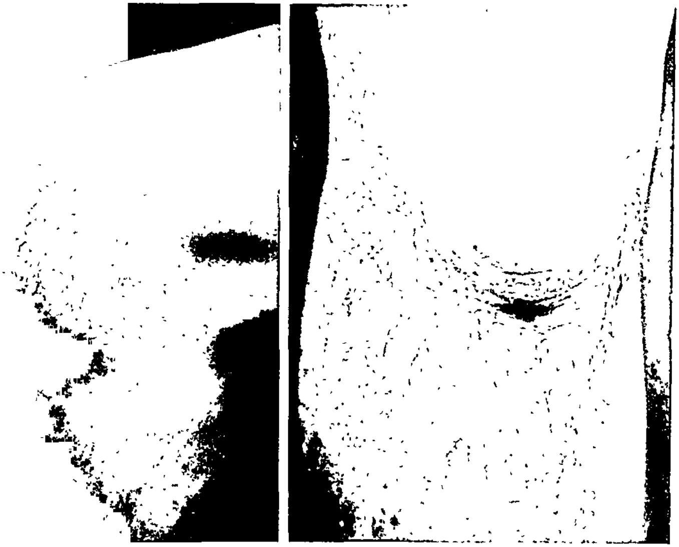

Fig. 1.—Lateral and anterior views of the knee, showing enlargement of the anterior tibial tubercle.

per cent) mentioned a traumatic episode prior to the onset of difficulty. In some cases the trauma was direct, e.g., a direct blow, or indirect, occurring as a result of prolonged marching, crawling etc. Practically all of the patients in this group complained of pain following entry into active service. Thirteen patients with pain since their early teens were unable to remember any specific incidents of trauma. Many of these patients had relief of symptoms after their initial treatment in civilian life, only to have a recurrence of the difficulty in the service. It is conceivable that in this group the traumatic incident had been forgotten, considering the time involved, and it is our opinion that trauma is probably the most important etilogic factor.

Pathologic Picture.—In reviewing the 15 cases in which the patients were treated surgically, it is noted that all sections

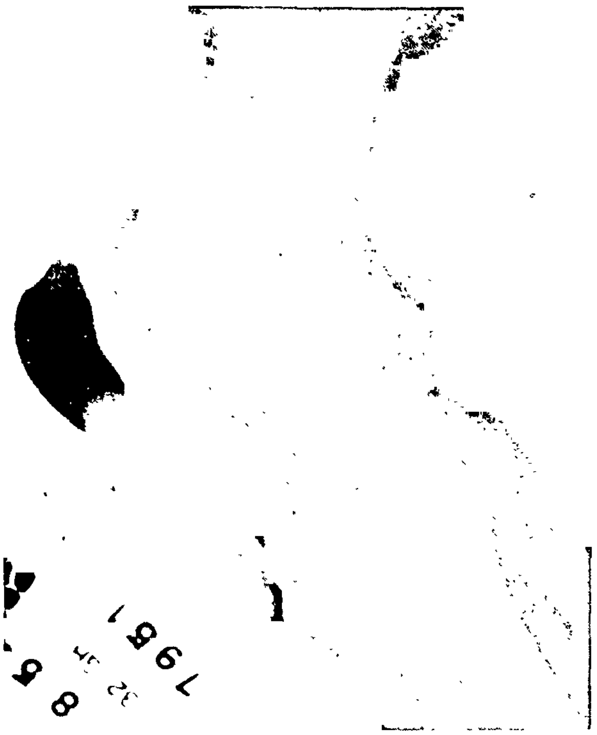

Fig. 2.—Roentgenogram of the knee, showing the ossicle within the infrapatellar tendon.

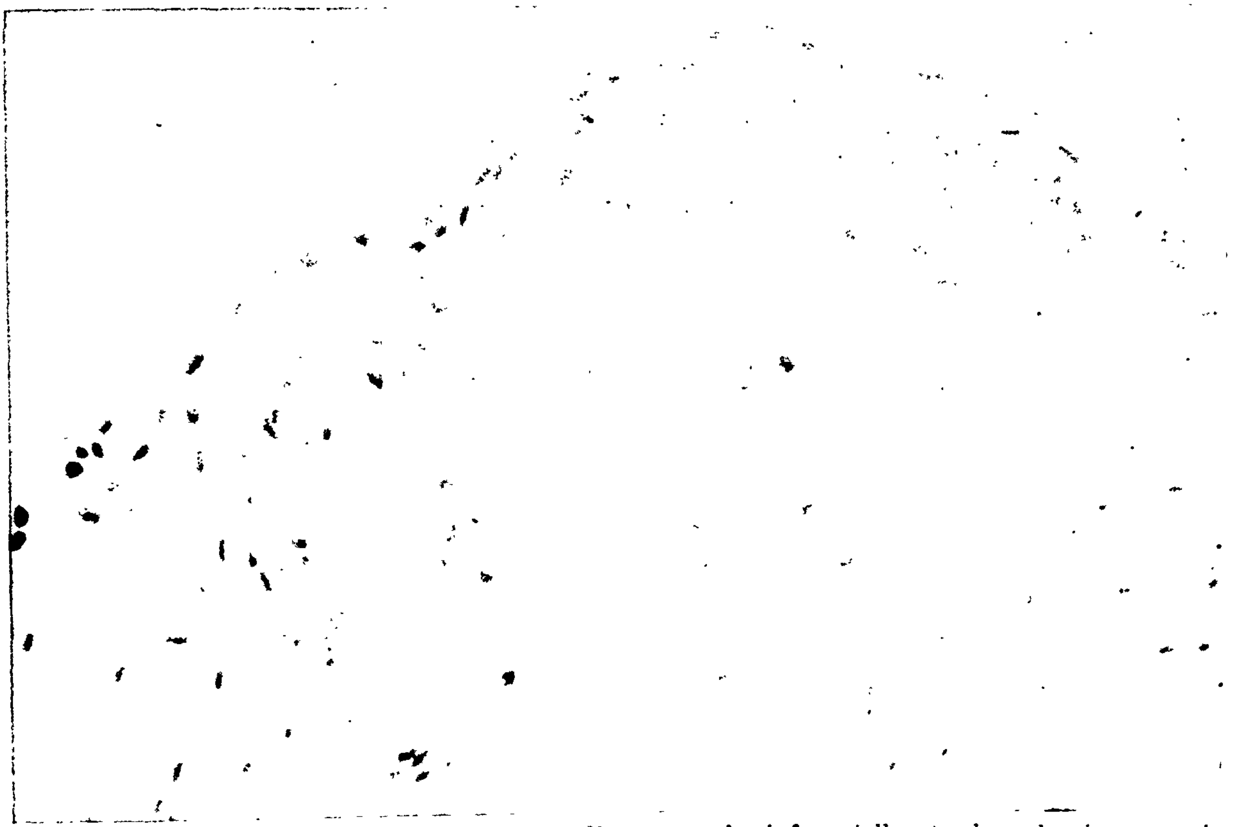

Fig. 3.—Photomicrograph of synovial tissue adjacent to the infrapatellar tendon, showing no evidence of inflammation. × 153.

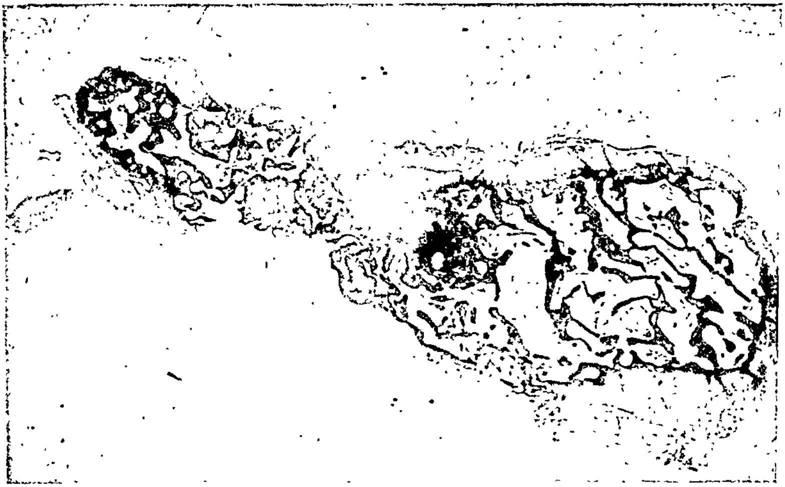

Fig. 4.—Photomicrograph showing the cancellous quality of the bone. × 7.

showed a spongy type of bone with a thin cortex imbedded entirely within the tendon (Figs. 5 and 6). In some instances the bone was dead, as was evidenced by the empty lacunae (Fig. 7), but in others the cells were living and the roentgenograms showed healthy bone trabeculation (Figs. 8 and 9). Hyaline cartilage was not present in any of these cases, but covering with a thin layer of fibrocartilage was observed in all, and in several instances cellular activity could be seen along the edge of the bone, suggesting osteogenesis. Several authors have stated that they were able to see scar and callus formation. We cannot confirm this. In no instance was there evidence of fresh fracture. In no section was hemosiderin pigmentation present. In several cases there was increased vascularity at the zone between the fibrocartilage and the tendon, an observation that has been mentioned by other authors (Fig. 10). In 2 cases what appeared to be a false joint was present between the tubercle and the intratendinous ossicle (Fig. 11). In our opinion the most important of these observations is the entirely intratendinous location of the ossicle.

Fig. 5.—Gross specimen, showing the ossicle covered with tendinous tissue.

Treatment.—Treatment should consist, initially, of conservative measures, usu-

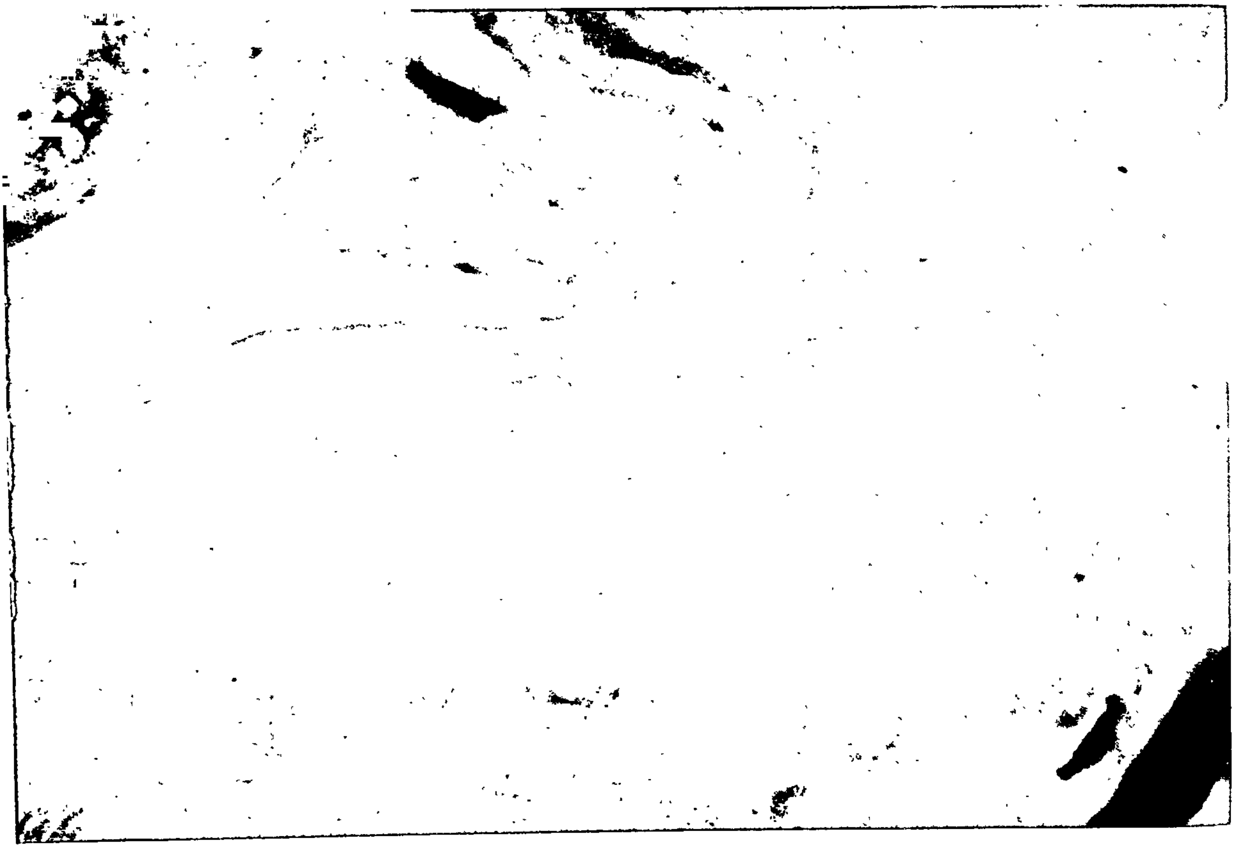

Fig. 6.—Photomicrograph of the ossicle, revealing dead bone. Note the empty lacunae and haversian canals. × 92.

ally injection deep to the tendon with Hydrocortone and immobilization by means of a cylinder cast or the application of a posterior splint for several weeks, followed by gradual mobilization and whirlpool baths. After conservative therapy a trial of function is given in our physical therapy department by bicycle riding and quadriceps exercises. If there is any improvement, the patient is returned for a trial of duty. If there is no improvement, the ossicle is surgically removed from the infrapatellar tendon (Fig. 11). Postoperatively no immobilization is used. The patient is immediately started on quadriceps exercises and is returned to duty after several weeks. Of the 15 patients operated on, 13 have obtained relief, while 2 state that they are no better.

COMMENT

Since the original work of Osgood and Schlatter, the main controversial point about this disease has been the question: Are the symptoms due to avulsion of the anterior tibial tubercle with nonunion of the fragment, as stated by the original authors, or do they result from ossification within the infrapatellar tendon? Supporting the original papers is the series of Uhry, and supporting the contention that ossification within the infrapatellar tendon is the cause of the condition is the series by Hughes. Cole, in a study of 24 cases, concluded that swelling within the infrapatellar tendon caused by the stretching of rapid growth during the adolescent period is the cause of this clinical entity and that, after the swelling, secondary

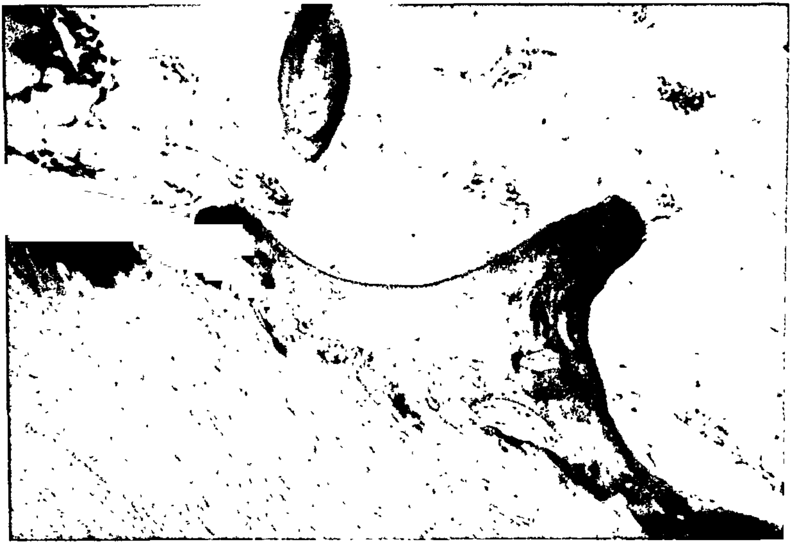

Fig. 7.—Photomicrograph showing tendon tissue, fibrocartilage and living bone. × 295.

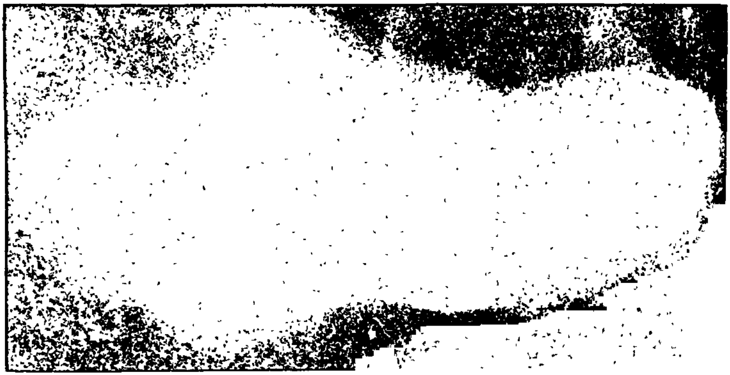

Fig. 8.—Roentgenogram of ossicle, showing healthy bone trabeculation.

changes in the tendon may occur in the form of calcification. Our series, as has been mentioned, differed from others reported in that the patients were older and

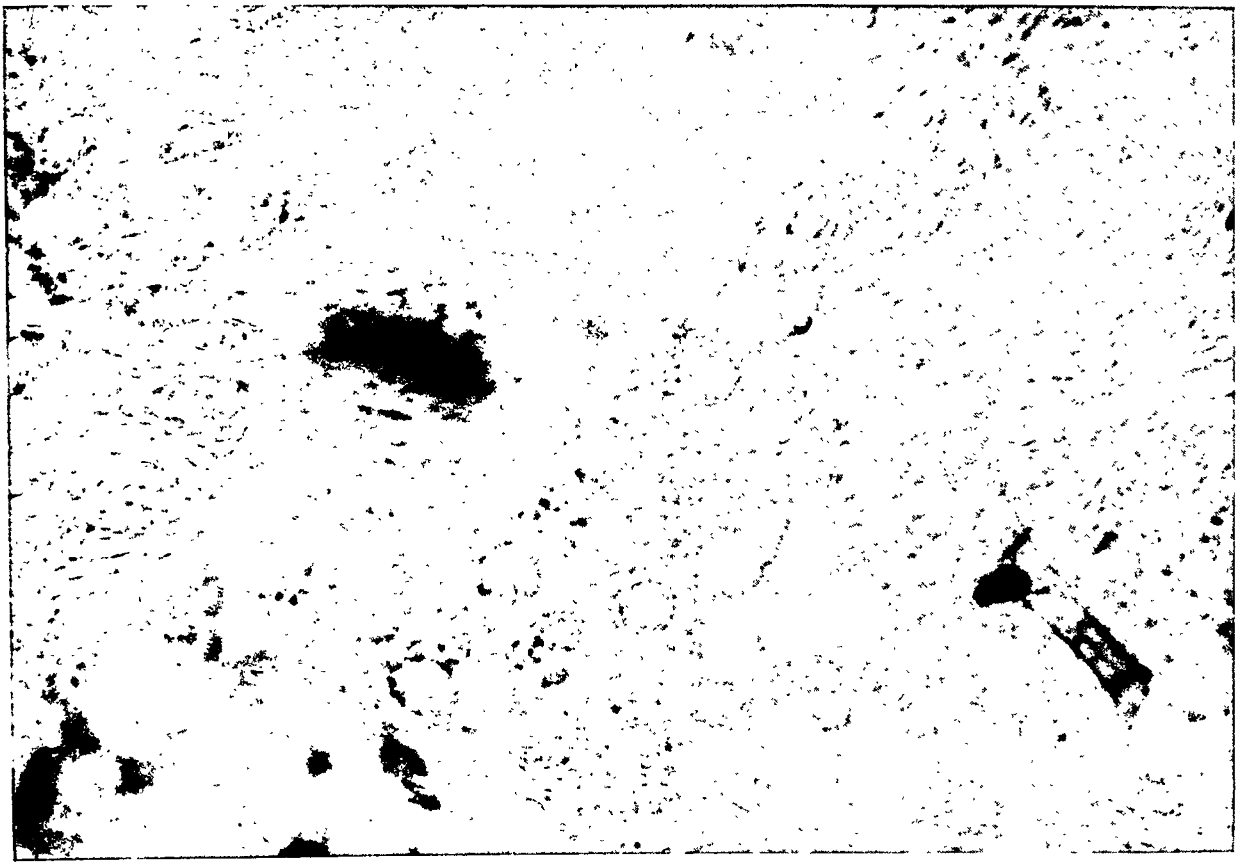

Fig. 9.—Photomicrograph showing increased vascularity in the zone between fibrocartilage and tendon. × 295.

that half of them dated the onset of their symptoms by some form of trauma occurring after entry into service. Eighty-seven per cent of the patients had complete closure of the proximal tibial epiphysis, which, according to Osgood and Schlatter, results in relief of symptoms in most instances. From our observations, we must come to the conclusion that trauma, with consequent ossification within the infrapatellar tendon, is the cause, and that if the symptoms persist the ectopic ossicle should be surgically removed. Evidence in favor of this theory is as follows: 1. In over half of our patients symptoms developed after trauma occurring at an age when the epiphyses are closed. 2. No case of fresh fracture of the tubercle was observed. 3. The ossicle within the infrapatellar tendon was entirely within the tendon in all cases. 4. The ossicle in most instances was viable. 5. Cellular activity suggesting osteogenesis was evident in several instances. 6. No hemosiderin pigmentation was seen, which indicates absence of the bleeding into the tissues that might be expected with an avulsion type of fracture.

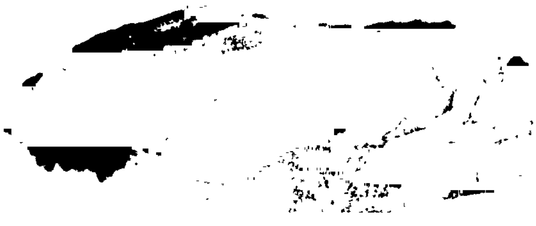

Fig. 10.—View of ossicle. Note articular cap of fibrocartilage that formed pseudoarthrosis with anterior tibial tubercle.

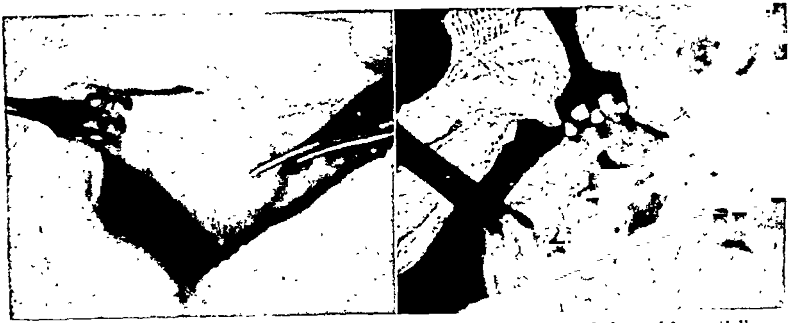

Fig. 11.—Photographs showing, respectively, the infrapatellar tendon and the ossicle partially removed from it.

In the 13 patients with symptoms dating from their teens and with no remembrance of specific trauma, avulsion of the tubercle may conceivably have been the cause. In our opinion, however, a mechanism similar to that suggested by Cole is more likely. The presence of dead bone within the infrapatellar tendon, which was observed in several cases, can be explained by avulsion of the tubercle, but it can be explained equally well by ectopic ossification with an inadequate blood supply and eventual death.

CONCLUSIONS

1. The cause of the condition known as Osgood-Schlatter's disease is trauma, either direct or indirect, with consequent ossification within the infrapatellar tendon. 2. Active military service may precipitate and increase the symptoms of Osgood-Schlatter's disease. 3. Inflammation, osteochondritis and vascular and endocrine changes play no part in this disease. 4. The initial treatment should be conservative. 5. Surgical removal of the ossicle within the infrapatellar tendon will produce relief of symptoms in most cases.

SUMMARY

The diagnosis of Osgood-Schlatter's disease in military personnel is frequently made on the basis of symptoms and roentgen observations. In the past year the authors have treated 30 patients with thirty-nine lesions involving the anterior tibial tubercle. The etiologic factors, the pathologic and clinical pictures and the treatment are discussed, and the following conclusions are drawn: 1. The case etiology is trauma, with secondary ossification within the infrapatellar tendon. 2. Symptoms may be initiated or increased by military service. 3. Inflammation plays no part in the disease, nor do vascular and endocrine disturbances. 4. Initial treatment should be conservative. 5. Surgical removal of intratendinous ossicle will relieve the symptoms in most cases.

ZUSAMMENFASSUNG

Die Diagnose der Osgood-Schlatt
Erkrankung bei mili [illegible]
wird häufig auf Gru
der Röntgenbefund
genen Jahr haben
ke mit 39 Erkra
Schienenbeinhöcke

sächlichen Faktoren, die Pathologie, das klinische Bild und die Therapie werden erörtert und folgende Schlüsse gezogen: 1. Die Ursache ist Trauma mit sekundärer Verknöcherung innerhalb des infrapatellaren Sehnenabschnitts. 2. Die Symptome können durch Militärdienst hervorgerufen oder verstärkt werden. 3. Weder Entzündung noch vaskuläre oder endokrine Störungen spielen bei der Erkrankung eine Rolle. 4. Die Behandlung soll im Anfang konservativer Natur sein. 5. Die chirurgische Entfernung der Knöchelchen innerhalb der Sehne führt in den meisten Fällen zur Beseitigung der Symptome.

RÉSUMÉ

Au cours de l'année écoulée les auteurs ont traité 30 malades avec 39 lésions (maladie d'Osgood-Schlatter) intéressant le tubercule tibial antérieur. Les auteurs discutent les facteurs étiologiques, le tableau clinique ainsi que le traitement, et arrivent aux conclusions suivantes: 1. La cause étiologique est le traumatisme, avec ossification secondaire du tendon patellaire. 2. Les symptômes peuvent être causés ou augmentés par le service militaire. 3. L'inflammation ne joue aucon rôle dans cette affection; il en est de même des troubles vasculaires et endocrinies. 4. Le traitement initial devrait être conservateur. 5. L'ablation chirurgicale soulage les symptômes dans la majorité des cas.

RESUMEN

El diagnóstico de la enfermedad de Osgood-Schlatter en el personal militar se hace frecuentemente por la sintomatología y observaciones roentgenólógicas. En el año pasado los autores trataron 30 pacientes, con treinta y nueve lesiones que afectaron el tubérculo anterior de la tibia. Se mencionan los factores etiológicos, la imagen clinica y patológica y el tratamiento, derivándose las siguientes conclusiones: 1. La etiología es el trauma con osificación secundaria del tendón subrrotuliano. 2. Los síntomas pueden iniciarse o aumentarse por el servicio militar. La inflamación no interviene en la enfermedad, lo mismo que las perturbaciones vasculares o endócrinas. 4. El tratamiento inicial debe ser conservador. 5. La extirpación quirúrgica de la porción osificada alivia los síntomas en la mayoría de los casos.

RIASSUNTO

La diagnosi della malattia di Osgood-Schlatter si fonda sull'esame clinico e radiologico. Nello scorso anno gli autori hanno curato 30 pazienti con 39 lesioni del tubercolo tibiale anteriore.

Dopo una rassegna dei fattori etiologici, di quadri clinici e anatomopatologici e dei metodi di cura, essi giungono alle seguenti conclusioni: 1) il trauma è la causa della malattia, con ossificazione secondaria del tendine infrapatellare; 2) i disturbi possono comparire o aggravarsi durante il servizio militare; 3) l'affezione non è di natura infiammatoria, nè su base vascolare endocrina; 4) la cura, all'inizio, deve essere conservativa; 5) in molti casi si otterrà la guarigione con l'asportazione chirurgica dell'ossicino intratendineo.

SUMARIO

O diagnóstico da molestia de Osgood-Schlatter no pessoal militar é frequentemente feito endo como base a sintomatologia e as observações radiológicas. No ano passado os A.A. trataram 30 pacientes com 39 lesões que abrangiam o tuberculo anterior da tibia. Os fatores etiológicos, os quadros clinico e patológico e o tratamento são discutidos, sendo apresentadas as seguintes conclusões: 1) O fator etiológico é o trauma, com ossificação secundária dentro do tendão rotuliano. 2) Os

sintomas podem ser iniciados ou aumentados pelo serviço militar. 3) A inflamação não tem influencia alguma sobre a moléstia, nem alterações vasculares ou endocrinas. 4) O tratamento inicial deve ser conservador. 5) A extirpação cirurgica do ossiculo intratendinoso trará alivio dos sintomas na maioria dos casos.

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God made man a little lower than the angels, and he has been getting a little lower ever since.

—*Rogers*

Spinal Anesthesia

Conclusions Based on Its Use in 10,350 Cases at the Jackson Clinic, Madison, Wisconsin

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To Corning,[1] a neurologist of New York, goes the credit for recognizing, naming and applying the principles of conduction anesthesia to the structures enclosed in the spinal canal. This original work was done in 1885, with cocaine as the anesthetic agent. In 1891 Quincke[1] emphasized the feasibility and safety of the spinal puncture. Then in 1899, fourteen years after Corning's work, Bier[1] and his assistant Schmeiden of Kiel, Germany, introduced the use of spinal anesthesia. The procedure was promptly tried by many surgeons but was soon dropped because of the dangers and technical difficulties.

In 1904 interest in spinal anesthesia was renewed when Kendirdjy[1] of Paris developed, as a substitute for cocaine, the use of the less toxic and more stable anesthetic Stovaine discovered by Fourneau, a French chemist.[1] Progress was again limited because of the number of fatalities, and to Babcock[2] goes a great deal of credit for maintaining interest in this new anesthetic, for it was he who went to France to study the work of Kendirdjy and returned with the new technics, which he used as a basis for further study.

The literature offers extensive reports of the work done by many workers in this field, including, to name but a few, Pitkin,[3] Tuffier,[3] Labat[3] and Jonnesco.[3] The work of Pitkin in 1928 had to do with the use of solutions lighter and heavier than the spinal fluid, and it was this work that served as the basis for the development of the volume control technic by Stout and Ewell[3] and Jackson.[4] A summary of a modification of this technic will be presented as it is now used in the Jackson Clinic and the Methodist Hospital in Madison.

During this period of development the popularity of spinal anesthesia waxed and waned, but because of improved technics and the development of newer, safer and longer-acting drugs, progress continued, and the use of spinal anesthesia became more nearly universal. During this period there were some fatalities, complications, and failures, but these were due, according to Babcock,[5] to blunders and to the careless and indiscriminate use of various innovations in drugs, needles, combinations of drugs, etc., tried in an effort to make spinal anesthesia safe and foolproof. The safety or danger of spinal anesthesia depends on the user rather than on the drug, technic or needle.[5] This does not mean that there is no such thing as a proper technic, drug, needle or variation

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From the Department of Surgery, the Jackson Clinic, Madison.

Read at the Marquette University Medical School-Jackson Clinic Postgraduate Clinic, Sept. 25, 1954.

Submitted for publication Oct. 14, 1954.

of drugs to use; it does mean that care and skill are necessary in their use.

Throughout this growth period certain desirable features, certain undesirable features and certain contraindications were noted. Some of the advantages that were observed at the Jackson Clinic as well as elsewhere and have been described by Anderson[6] are:

1. It is a complete anesthesia. All sensation below the level of the block is abolished except that mediated through the vagus nerve.

2. It induces greater muscular relaxation for major procedures than does any other form of anesthesia.

3. It offers ease and safety of administration. With proper technic, training and experience there should be no difficulties. The best argument for the safety of spinal anesthesia is that, considering the large number of inductions by relatively inexperienced administrators over a period of years, the complications and fatalities have been surprisingly few.[4b]

4. Proper technic precludes side effects. Here again proper technic means careful, experienced and understanding use, rather than the use of some special, fanciful method, needle or drug.

5. There is minimal central depression. This is important when one considers that there is no need to ablate the functions of the entire brain to interrupt the functions of one part of the nervous system.

6. It provides selective autonomic block. The portion of the autonomic system affected can be controlled, as they cannot be with the use of d-tubocurarine and some other relaxants.

7. It promotes a quicker return to normal. By encouraging early ambulation, it reduces postoperative complications.

8. There is no danger of explosion.[5]

Although spinal anesthesia has been used for surgical procedures of the thorax, neck, thyroid, mastoid and upper extremities, its use should be limited to operations below the diaphragm. This limitation would appear to be the one undesirable feature.

Contraindications[6] vary with the various administrators and surgeons, but there are some generally accepted contraindications.

1. Disease of the central nervous system is a contraindication: (1) absolute (cord tumors, active, untreated pernicious anemia; active syphilis, malignant metastasis; poliomyelitis, etc.) (2) relative (old, treated pernicious anemia; syphilis; poliomyelitis, etc.). It is too easy to blame changes in the nervous system, real or imagined, upon spinal anesthetic.

2. Anemia may be a contraindication. There should be a minimum hemoglobin value of 8 Gm. per hundred cubic centimeters of blood. Spinal anesthesia induced by blocking the sympathetic nerves creates a larger potential vascular bed and thus produces a relative increase of anemia. This factor, except in the case of emergency, can be at least temporarily corrected by transfusions.

3. Circulatory disorders, such as severe coronary disease, severe arteriosclerosis and valvular heart disease, may be contraindications.

4. Spinal anesthesia should not be used in the presence of shock. Circulatory disorders and shock can be wholly or partially compensated for by the use of intravenous fluids, whole blood and ephedrine or ephedrine-like drugs to maintain a stable blood pressure.

5. Local bony disease of the spine, injury to the spine, and local dermatitis are contraindications to this type of anesthesia.

Such factors as age, speech difference and fear can usually be overcome by the administrator, depending on his personality and his ability to reassure the patient and develop confidence.[5]

The surgeon is also a factor in the use of spinal anesthesia. He should not be rough; he should be calm and quiet in manner and should remember that, although the patient has been given sedatives and a spinal anesthetic, he may still be awake and can hear, so care in talking is essential.

With this brief summary of the development of spinal anesthesia, its use at the Jackson Clinic and Methodist Hospital over a period of twenty-five years and covering 10,350 cases will be reviewed.

The volume control technic for spinal anesthesia was developed at the Jackson Clinic in 1928, and it is this technic, with some modifications, that has been used and is being used at present. The technic is the product of development, and the cases to be discussed cover the period of this development. The volume control technic was made into the first talking medical motion picture and was widely used.

The technic of spinal anesthesia now used is as follows:

1. For hemorrhoids: Have the patient in the sitting position. Dissolve 50 mg. procaine hydrochloride in 1 cc. of spinal fluid and inject it into the subarachnoid space at the level of the fourth or fifth lumbar interspace. Keep the patient in the sitting position for five minutes. At the end of the five minutes the patient may be placed in any position without fear of spreading of the anesthesia.

2. For abdominal operations: With the patient lying on his side, a 19-gauge, 1½ inch (3.7 cm.) needle is inserted between the spines of the fourth and fifth or the third and fourth lumbar vertebrae, after the area has been infiltrated with a mixture of 1 per cent procaine hydrochloride containing ½ cc. of Vasoxyl. The guide needle is advanced to its hub in the direction of the spinal column. A 24-gauge needle is then inserted through the lumen of the guide needle and advanced carefully through the ligamentum flavum into the subarachnoid space. This procedure may be varied without changing the results or the principles of technic. The guide needle may be omitted, and instead of the small 24-gauge needle a 22-gauge needle may be used directly. After the needle has been introduced into the subarachnoid space by either method, the head of the table is depressed 10 degrees, and the patient's head is elevated on a folded pillow. Fifteen mg. of heavy nupercaine is then injected, and the needle with the guide needle, or the needle alone, as the case may be, is removed and the patient quickly turned on his back. The shoulder braces must be on the operating table to prevent the patient from sliding, and the head must be sharply flexed by the use of a folded pillow. The patient is then placed in a fairly sharp Trendelenburg position, and with a small needle the level of anesthesia is followed carefully every thirty seconds as it progresses up the abdomen. When the level of anesthesia is at the fourth thoracic segment (nipple level), the patient is placed in a horizontal position. Intravenous dextrose solution must be started immediately and blood pressure controlled by the use of oxygen inhalations. Intravenous Vasoxyl in doses of 1 minim at a time will raise the blood pressure to the proper level in most cases.

If these measures fail, the blood pressure can be quickly brought to a normal level by the use of 4 cc. of Levophed in 500 cc. of 5 per cent dextrose solution given intravenously. If the level of anesthesia is not obtained within five minutes, it is doubtful that it will go any higher; the patient should not be placed in the Trendelenburg position again, however, until at least twenty minutes have passed since the drug was injected intraspinally.

This level of anesthesia, at the level of the fourth thoracic segment, will suffice for any operation in the abdominal cavity, such as resection of the colon or stomach and procedures on the pancreas or biliary tract.

If the anticipated operation is in the pelvis or the lower part of the abdomen, it is necessary to use only 10 mg. of heavy nupercaine and to bring the anesthetic level only as high as the xiphoid process.

If it is desired to repair a unilateral hernia or to do any operation on the leg, unilateral spinal anesthesia may be obtained by using approximately one-half the usual dosage of nupercaine, keeping the affected side down and having the patient remain on his side for fifteen minutes.

Spinal anesthesia with heavy nupercaine, as aforedescribed, will cause adequate surgical anesthesia for about three to three and one-half hours. If a longer duration of anesthesia is desired, epinephrine chloride, 1:1,000, may be added to the anesthetic solution at the time of injection. A drop of epinephrine will prolong the anesthesia for a moderate amount of time. No more than 4 drops, however, can be used in the anesthetic.

If Levophed is used to control blood pressure, it may be necessary to continue giving intravenous Levophed for as long as thirty-six hours, at a rate that will maintain the blood pressure at the desired level. This must be watched closely.

If the level of spinal anesthesia goes too high, the patient will cease respiratory movements and must then be given artificial respiration by use of the bag. A warning, however, is usually given before this point arrives by the patient himself, who complains of being short of breath, bringing all his accessory respiratory muscles into play and making gasping movements with his mouth.

It is imperative that the head be sharply flexed until at least twenty minutes after injection of the anesthetic agent.

Recent use of intravenous Cortef postoperatively has been found to maintain the blood pressure, and after discontinuance of the medication the pressure is maintained. This drug is given in amounts of 100 mg. in 500 to 1,000 cc. of either 5 per cent dextrose in water or 5 per cent dextrose in saline solution. Another characteristic of Cortef is that it does not tend to elevate the blood pressure above the average normal level.

Spinal anesthesia was used at the Jackson Clinic as early as 1920, but in only 2 per cent of the cases; in 1928 the percentage had doubled; in 1929 the method was used in 71 per cent, and in 1930 in 80 per cent. This increase attests to the value of the technic, which was used as described with slight modifications. Its increasing popularity may also be expressed in another way. It was used in 79 of 342 possible cases in 1928, 893 of 1,253 cases in 1929 and 346 of 498 cases in 1930.[4a] In 1940, 308 spinal anesthetics were given; in 1941, 328; and in 1942, 382. These figures show a percentage comparable to that of the other years. In 1950, 580 spinal anesthetics were given; in 1951, 591; and in 1952, 547. To indicate that the percentage remained at about 70, the year 1952 was taken as a typical year, and the following facts were obtained: There were 937 major surgical procedures performed in the year between Jan. 1, 1952 and Dec. 31, 1952. Of this number, 148 involved the chest, neck, head and upper extremities, and spinal anesthesia was not considered advisable. This left a total of 789 major procedures in which spinal anesthesia was possible. Of this number, it was used in 547 cases, or, in other words, it was used in 69.3 per cent of the cases in which it was possible to use it. These 547 cases included 252 operations on the organs of the digestive system, 174 on the organs of the female generative system, 67 on the genitourinary tract and 54 on the lower extremities. That the percentage of 69.3 is below that of 80 per cent for the year 1930 is due to the fact that since 1930 new members joining the Clinic have received their training at other medical centers and by training and experience use other types of anesthesia because of choice rather than because of necessity.

There were 2 fatalities for this twenty-five year period. Both occurred in 1930 and possibly were caused by lowering the patient's head too soon after injecting the anesthetic agent and thus causing respiratory failure.

Complications have been minimal, and those of any serious note occurred prior to 1930, during the management of the first 1,000 cases, and consisted of 3 cases of postoperative pneumonia and 4 of temporary paresthesia. Since 1930 the complications, if they can be so called, have consisted of postspinal headache, temporary local back tenderness, and occasional postoperative hypotension, which was also temporary. Each of these conditions could be and was readily controlled or relieved.

SUMMARY

1. Spinal anesthesia is effective when used with knowledge, understanding, and care in an accepted manner.

2. Spinal anesthesia produces excellent abdominal relaxation, facilitating the surgical procedure and making closure easier and without tension.

3. Spinal anesthesia is as safe as any other form of anesthesia, or safer, when properly given and when the patient is under the supervision of an anesthetist throughout the procedure.

4. There is almost complete absence of postoperative distention after abdominal operations.

5. Postoperative complications are few, and those that do occur are generally temporary and mild.

6. The percentage of fatalities from spinal anesthesia is extremely low, especially when one considers its widespread use, often by administrators with minimal knowledge and experience and without the benefit of a trained anesthetist to follow the patient during the surgical procedure.

7. There are few undesirable side effects from the use of spinal anesthesia, and the postoperative course is smooth.

8. Failures in spinal anesthesia are few when the proper methods are used, and those that do occur are probably the fault of the administrant rather than of the technic, drugs or needle.

9. The conclusions presented are based on a study of spinal anesthesia as used in 10,350 cases at the Jackson Clinic over a period of twenty-six years.

10. Between 70 and 80 per cent of the abdominal and pelvic operations performed at the Jackson Clinic are performed with the patient under spinal anesthesia, for the reasons presented.

RÉSUMÉ

1. L'anesthésie spinale est efficace lorsqu'elle est utilisée prudemment.

2. Elle provoque un excellent relâchement abdominal facilitant la technique chirurgicale et permettant une fermeture plus facile, sans tension.

3. Elle est aussi inoffensive que n'importe quelle autre forme d'anesthésie, elle est plus sûre même, lorsqu'elle est pratiqué correctement, sous la direction d'un anesthésiste durant toute l'intervention.

4. Il n'y a pour ainsi dire pas de ballonnement post-opératoire après les opérations abdominales.

5. Les complications post-opératoires sont rares, et lorsqu'elles se produisent, elles sont en générales passagères et bénignes.

6. Le pourcentage de décès est bas, surtout si l'on tient compte de la large

utilisation de ce mode d'anesthésie, souvent pratiquée avec un minimum de connaissances et d'expérience et sans la présence d'un anesthésiste entraîné.

7. Les effets secondaires sont rares, les suites opératoires sont bonnes.

8. Les échecs de l'anesthésie spinale bien exécutée sont exceptionnels, et ceux que l'on observe sont probablement dus à celui qui la pratique, plutôt qu'à la methode (médicament ou aiguille).

9. Les conclusions des auteurs sont basées sur une étude de 10.350 cas d'anesthésie spinale de la Clinique Jackson, s'étendant sur une période de 36 ans.

10. Etant donné toutes les raisons énumérées, 70 à 80% des opérations abdominales et pelviennes sont faites sous anesthésie spinale à la Clinique Jackson.

SUMARIO

1. A anestesia raquidiana é eficaz quando utilizada de maneira adequada, com conhecimento, compreensão e cuidado.

2. A anestesia raquidiana produz excelente relaxamento abdominal, facilitando o ato cirúrgico e tornando mais fácil e sem tensão o fechamento do abdômen.

3. A anestesia raquidiana é tão segura quanto qualquer outra forma de anestesia, ou mesmo mais segura, quando adequadamente administrada e quando o paciente se encontra sob a supervisão de um anestesista durante todo o decorrer de sua duração.

4. Após operações abdominais há ausência quase completa de distensão pós-operatória.

5. As complicações pós-operatórias são escassas e aquelas que ocorrem são em geral de pequena duração e sem gravidade.

6. A porcentagem de falhas da anestesia raquidiana é extremamente baixa, especial quando se considera a sua ampla utilização, seu emprêgo por pessôas sem conhecimento e experiência e sem a vantagem da presença de um anestesista treinado para acompanhar o paciente durante o ato cirúrgico.

7. Há poucos efeitos desagradáveis como conseqüência da anestesia raquidiana e a evolução pós-operatória é suave.

8. As falhas da anestesia raquidiana são poucas quando usados métodos adequados, e aquelas que ocorrem se dão provàvelmente mais por falta de quem administra do que como conseqüência da técnica, drogas ou agulha.

9. As conclusões apresentadas são baseadas num estudo da anestesia raquidiana conforme empregada em 10.350 casos na Clínica Jackson durante um período de 26 anos.

10. Entre 70 a 80% das operações abdominais e pélvicas feitas na Clínica Jackson, o foram com pacientes sob anestesia raquidiana, devidas às razões apresentadas acima.

ZUSAMMENFASSUNG

7. Die Spinalanästhesie ist erfolgreich, wenn sie mit dem nötigen Wissen und Verständnis in der allgemein anerkannten Weise ausgeführt wird.

2. Die Spinalanästhesie führt zu ausgezeichneter Entspannung der Bauchmuskulatur und erleichtert dadurch das chirurgische Vorgehen und die Schliessung des Bauches ohne Spannung.

3. Die Spinalanästhesie ist genau so ungefährlich wie alle anderen Formen der Narkose und, wenn sie während der gesamten Dauer des Eingriffs unter der Aufsicht eines Anästhesiologen sorgfältig durchgeführt wird, sogar weniger gefährlich.

4. Nach der Operation am Bauch gibt est fast keine postoperativen Auftreibungen.

5. Es gibt nur wenige postoperative Komplikationen, und wenn sie auftreten, sind sie im allgemeinen nur vorübergehend und leichter Natur.

6. Der Prozentsatz der Todesfälle infolge von Spinalanästhesie ist ausserordentlich gering, besonders wenn man in Betracht zieht, wie umfangreich ihre Anwendung ist, und wie häufig sie von Unerfahrenen und ohne die Unterstützung eines ausgebildeten Anästhesiologen, der den Kranken während des chirurgischen Eingriffs beobachten sollte, ausgeführt wird.

7. Die Spinalanästhesie wird nur selten von unerwünschten Nebenerscheinungen begleitet, und der postoperative Verlauf ist glatt.

8. Versager der Spinalanästhesie treten bei Anwendung richtiger Methoden nur selten auf und dann wahrscheinlich eher infolge von Unzulänglichkeiten des Narkotiseurs als der Methode, des Arzneimittels oder der Nadel.

9. Die Verfasser stützen ihre Schlussfolgerungen auf eine Untersuchung eines Materials von 10350 Fällen, an denen die Spinalanästhesie innerhalb von 26 Jahren in der Jackson-Klinik ausgeführt wurde.

10. Aus den angeführten Gründen werden etwa 70 bis 80% aller Bauch- und Beckenoperationen in der Jackson-Klinik unter Spinalanästhesie ausgeführt.

RIASSUNTO

1. La rachianestesia dà ottimi risultati quando è correttamente eseguita.

2. La rachianestesia produce un alto grado di rilasciamenteo delle pareti addominali, assai utile ai fini dell'intervento chirurgico e della sutura.

3. Quando è ben eseguita e quando il paziente rimane costantemente sotto il controllo di un anestesista, la rachianestesia è altrettanto sicura. se non di più, di qualsiasi altro metodo di anestesia.

4. Dopo interventi sull'addome, manca quasi del tutto ogni forma di distensione.

5. Poche, temporanee e lievi, sono le complicazioni post-operatorie.

6. I casi di morte imputabili alla rachianestesia sono estremamente rari, specie se si considera il suo larghissimo uso da parte, per di più di gente che la pratica senza alcuna conoscenza ed esperienza, e senza che vi sia alcun anestesista pratico che sorvegli il malato lungo tutto il corso dell'intervento.

7. La rachianestesia dà pochi indesiderabili effetti collaterali, e il decorso postoperatorio è buono.

8. Usando tecnich appropriate gli insuccessi della rachianestesia sono rari e dipendono, molto probabilmente, più da chi l'ha praticata che non da difetti del metodo, dell'anestetico, dell'ago.

9. Le conclusioni provengono da uno studio di 10.350 rachianestesie praticate nella Jackson Clinic in 26 anni.

10. Per le suesposte ragioni il 70-80% degli interventi sull'addome e sugli organi pelvici vengono praticati, nella Jackson Clinic, con rachianestesia.

RESUMEN

1. La anestesia raquídea es efectiva cuando se usa con conocimiento y cuidado.

2. Produce una relación abdominal excelente, facilitando el procedimiento quirúrgico y haciendo fácil el cierre sin tensión.

3. Es tan segura somo cualquier otras forma de anestesia, o aún más segura, cuando se dá adecuadamente y con el paciente bajo control del anestesista.

4. Existe casi completa ausencia de distensión postoperatoria después de operaciones abdominales.

5. Las complicaciones postoperatorias son pocas y cuando se producen, generalmente son temporales y moderadas.

6. El porcentaje de fatalidades es notablemente bajo, especialmente si se considera su uso tan amplio, por personas con conocimientos y experiencia mínima y sin las ventajas de un anestesista entrenado para controlar al paciente durante la intervención.

7. Existen pocos efectos desagradables y el curso postoperatorio es tranquilo.

8. Los fracasos son pocos cuando se usan los métodos apropiados, aquellos que ocurren probablemente son debidos a quien aplica la anestesia y no a la técnica, medicamentos o aguja.

9. Las conclusiones que se presentan estan basadas en el estudio de 10,350 casos de la Clínica Jackson durante un período de veintiseis años.

10. Por las razones presentadas del 70 al 80 por ciento de las operaciones abdominales y pélvicas de la Clínica Jackson han sido llevadas a cabo con anestesia raquídea.

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> The philosophy of history shows that every feature of human evolution is accompanied by human illusion, and in fact the progress seems quicker and advance greater in proportion to the depth and vitality of the illusion for which mankind has such a powerful inclination. To urge us and lead us, and above all to give us courage, we need the great spell-binders. We have to judge the power of every piece of knowledge, every act of science, every event, by its mixture of profound truth and wonder-working magic; the truth we must grasp with clear heads, but the spell of the magic is what makes our hearts beat and gives us hope in the fatigues of the journey, 'beyond the utmost bond of human thought,' as Tennyson's Ulysses aspired to travel.
>
> —*Williams*

The Laminar Wedge Graft Method of Spinal Fusion

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EVER since the first spinal fusion was performed, orthopedists have been plagued with pseudoarthroses. The percentage of failures in the lumbosacral portion of the spine has varied as reported by different authors, and generally the percentage has been proportionate to the number of segments fused, being approximately 33 per cent when 4 or more segments were included. Efforts to reduce the number of failures have been made by changing surgical technics, by changing the graft material and by changing the methods of fixation, but a perfect method has not yet been found. The ideal method would be simple, achieve rapid fusion and never fail.

This is a preliminary report of a promising procedure with which I have had experience in a small number of cases. No claim for originality is made, although, so far as I know, this method has not been described in the literature until now.

Anatomic Background.—Various measurements of the lumbar portion of the spine were made of 26 skeletons in order to obtain mean values (see table), since these would be important in performing the operation and would indicate where ample bone is available and where care must be exercised. The thickness of the fourth and fifth lumbar laminae was recorded, as well as that of the upper sacrum and that of the posterior spinous processes of the fourth and fifth lumbar vertebrae.

The minimum thickness of the fourth lumbar lamina was 0.4 cm. and the maximum 0.8 cm. The mean thickness was 0.59 cm.

The minimum thickness of the fifth lumbar lamina was 0.4 cm. and the maximum 0.8 cm. The mean thickness was 0.6 cm., there being a difference of only 0.1 cm. in favor of the fifth lumbar lamina.

The minimum thickness of the lamina of the first sacral vertebra in 35 skeletons was 0.3 cm. and the maximum 0.8 cm., the mean value being 0.48 cm. (Fig. 1). From these data it is obvious that the sacral lamina is approximately 0.12 cm. thinner than the fourth and fifth lumbar laminae. The bone of the sacral lamina, however, is largely cortical, while that of the lumbar lamina is largely cancellous. This indicates (1) that greater difficulty will be experienced in splitting the sacral lamina; (2) that fusion of the grafts to it will be slower, and (3) that a possible future pseudoarthrosis will most probably occur at this area, the lower end of the bony bridge.

Measurements

Thickness of	*Minimum, cm.*	*Maximum, cm.*	*Mean, cm.*
4th lumbar vertebra...	.0.4	0.8	0.59
5th lumbar vertebra	0.4	0.8	0.6
1st sacral vertebra . .	0.3	0.8	0.48
Posterior spinous process of 4th & 5th lumbar vertebra . . .	0.45	0.75	0.60

Read at the Convention of the Western Orthopaedic Association at Sun Valley, Idaho, October 19[illegible]
Submitted for publication Oct. 4, 195[illegible]

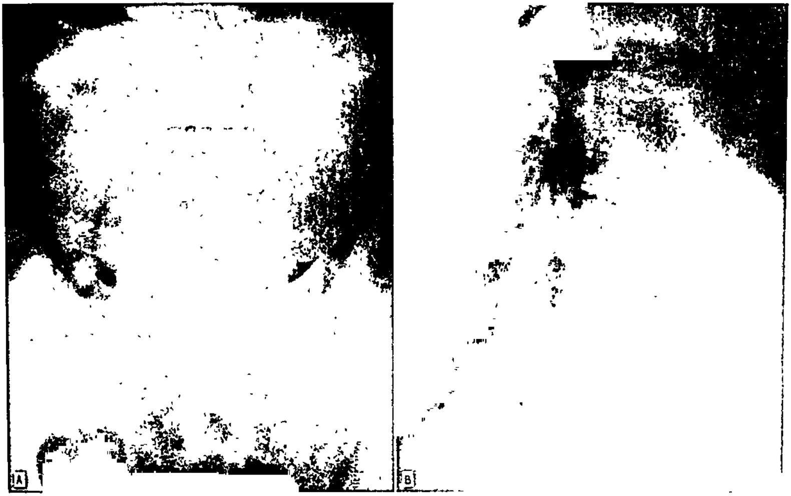

Fig. 1.

The thickness of the posterior spinous process in its narrowest portion was 0.45 cm. and the maximum 0.75 cm. This thickness is comparable to that of the lumbar vertebral laminae, and, since the posterior spinous process is chiefly spongy bone, offers another good site for grafting. It was first utilized for this purpose by Albee and is also used in my own method.

One peculiarity of the laminae of the lower lumbar vertebrae in man is that they are all in different planes (Fig. 2), being placed like the shingles on a roof but farther apart. This has importance in any grafting procedure, because it is more difficult to obtain good bony contact than if the laminae were in the same place. Thus a straight graft laid on these laminae would be in poor contact with the most prominent portions. Good osseous contact is essential, as it is axiomatic that the rapidity and success of bony union is proportional to the areas of raw bone in contact. The method to be described enables the surgeon to avoid the aforementioned difficulty, because the graft is a wedge inserted into a cleft.

Operation. — The fusion technic to be described has been used 16 times in the lumbosacral portion of the spine, once in the cervical portion and never, as yet, in the dorsal portion.

In the cervical vertebrae the fusion included only 2 segments. In the lumbosacral area the operation included the fourth and fifth lumbar and the first sacral vertebrae.

The basic part of the procedure is a grafting of the laminae with autogenous bone removed from the iliac crest. After a superficial decortication of the laminae of the lumbar vertebrae and the sacrum, a curved osteotome is used to split the laminae in a frontal plane, prying up a ledge of bone with the opening placed medially (Fig. 3). In the lumbosacral fusion this cleft is made similarly in the fourth and fifth lumbar laminae bilaterally and

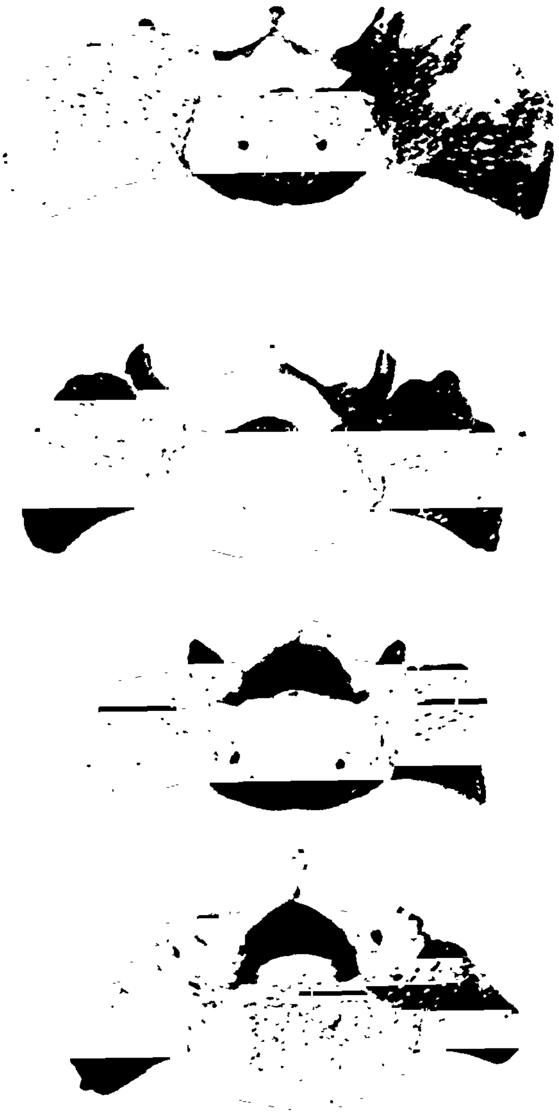

Fig. 2.—Variations in thickness and shape of the first sacral lamina.

also in the sacrum. Since the sacral lamina is sometimes rather thin, a thin osteotome is needed and care must be taken not to splinter the bone. Fracture into the sacral canal has occurred, however, and was without incident. If the laminae are split and the crevice extends into the apiphysial joint, no harm is done; in fact, in my opinion, this is beneficial, as it may help to ankylose this joint. After the split lamina has been pried up, opening the cleft, wedges of bone are removed from the outer side of the iliac crest, approximately 3 inches (7.5 cm.) long, ½ inch (1.2 cm.) wide and about ⅛ inch (0.3 cm.) thick. These wedges are then placed into the laminar and sacral crevices and tapped into place rather solidly, after which they become self-retaining. If two short pieces of wedging bone are used they may be overlapped, but the lap must be under a laminar flap to make it tight. This procedure is performed bilaterally (Fig. 4).

Although this method of inserting a graft between the laminae is the essential step of my method and has been done in every case, the insertion alone is considered insufficient. Additional fusion areas are always attacked and conventional procedures utilized; these have been different in almost every case. Some of these secondary procedures are as follows:

The same wedging procedure is then carried out on the two sides of each posterior spinous process near its base, where the bone is thickest, the osteotome being in the sagittal plane. In the sacrum a new cleft is made if the spinous process is large, but if it is small the cleft already made is used. Wedges of iliac bone are again inserted into these clefts and tamped down firmly. In several cases bone was placed across one side of the posterior spinous processes and held with screws. The apophysial joints are also treated in various ways. If the apophysial joints can be fused also, a faster fusion may occur, and possibly a stronger spine. A successful fusion between the laminae is not dependent upon a fusion of the apophyses, but fusion of both areas is ideal if it can be done. Curetting these joints, however, allows play and motion, and the efficacy of this method is therefore questionable, since it is mechanically unsound. A better method is to place small grafts across the joint in one way or another, and in several cases a transverse cleft was made and small grafts placed therein. In 1 case a drill hole was made transversely through the joint and small grafts placed in the hole, crossing and joining both articular processes. Additional bone chips are packed over the laminae in all instances.

The aforedescribed combination of procedures results in six fusion areas, three on each side, two connecting the laminae, two connecting the posterior spinous processes and two crossing the apophysial joints with grafts.

After bed rest and removal of skin sutures, a close fitting jacket is applied and worn by the patient for four months. This is followed by a chair back brace or corset which is gradually discontinued.

Experiments on Dogs.—In order to throw more light on what happens to the grafted area, 5 dogs were operated upon, the wedge graft method alone being used and all other procedures omitted.

The lumbar portion of the dog's spine differs from that of man in some respects. There are seven lumbar vertebrae instead of five, and the laminae are shorter. The apophysial joints are therefore closer to the posterior spines, and there is less room in which to make the clefts for the grafts. The sacral laminae are also very thin and consist of solid cortical bone, which makes it difficult, if not impossible, to split in a frontal plane without fracturing into the sacral canal. The laminar clefts were consequently placed more medially, beginning at the base of the posterior spine and extending laterally into the laminae. Only one graft was placed on a single side, and all additional procedures added were omitted in order that the result of the single graft, uncomplicated by combinations, might be observed later.

Five spinal fusion operations were performed. In 1 of them only two vertebrae were fused—the seventh lumbar and first sacral; in the others three vertebrae were fused, the sixth and seventh lumbar to the first sacral.

No postoperative fixation of the spines of the dogs was attempted, and no observable infection occurred. The operative sites were re-explored from four to six weeks later, the results being as follows:

Dog 1: Fusion between the seventh lumbar and the first sacral vertebrae successful.

Dog 2: Fusion between the fifth, sixth and seventh lumbar vertebrae successful.

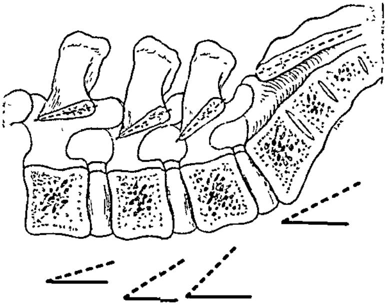

Fig. 3.—Lumbar laminae. Note that these are in different planes.

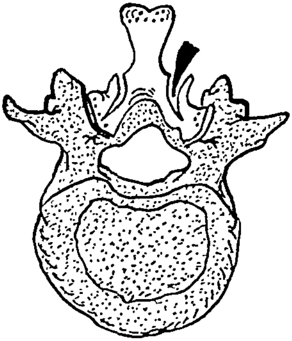

Fig. 4.—After superficial decortication. aminae split in a fro

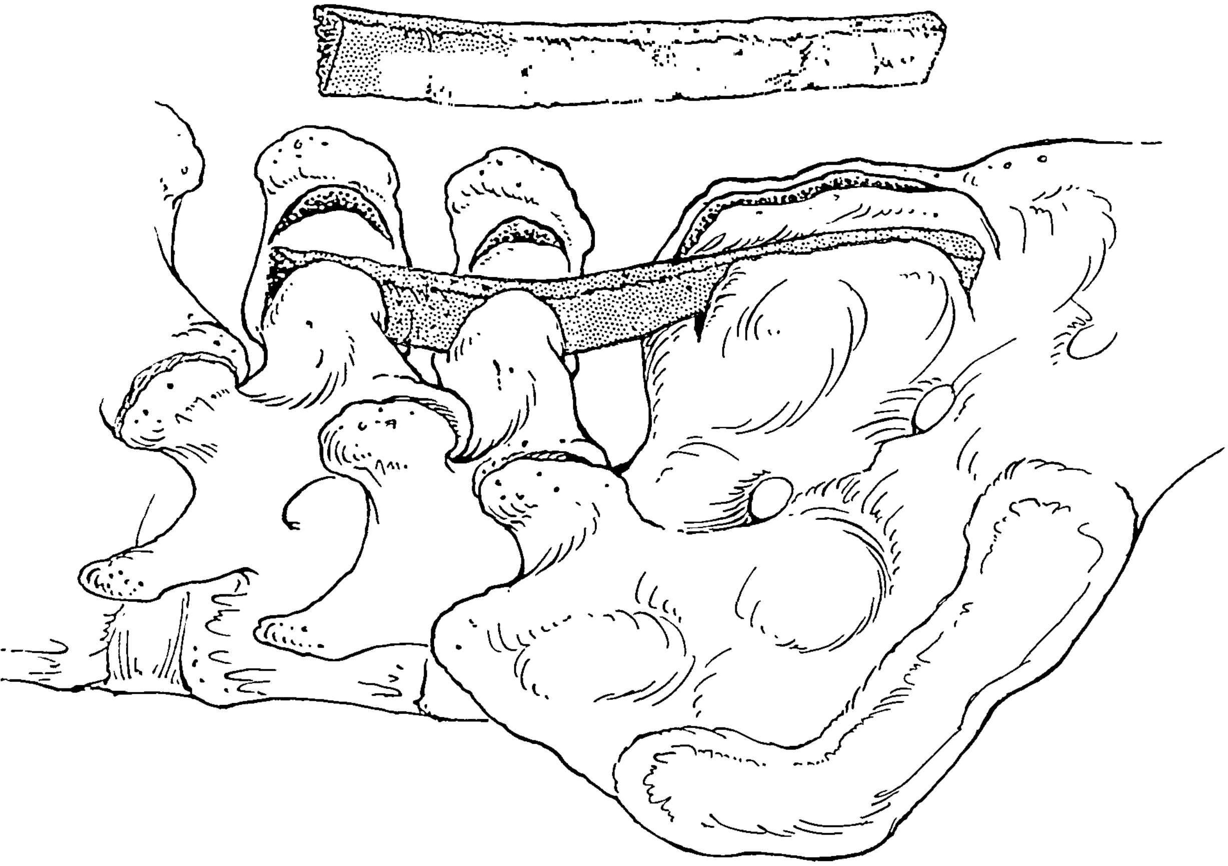

Fig. 5.—Wedge-shaped iliac graft inserted into the laminar clefts.

Dog 3: Fusion between the sixth and seventh lumbar to the first sacral vertebrae; pseudoarthrosis at the lumbosacral junction.

Dog 4: Absorption of most of the graft.

Dog 5: Postoperative death.

The failure of the operation in Dog 3 was apparent at the lower end of the graft connecting the first sacral and the seventh lumbar vertebrae, where a pseudoarthrosis occurred. This is the weak spot in any fusion, as the sacrum consists of a larger percentage of cortical bone than is present in the laminae and spinous processes of the lumbar vertebrae. Since the blood supply and osteogenic power of cortical bone is inferior, failure of fusion could be expected to occur more frequently at this point. In the successfully fused areas, union was solid and very little excess callus was seen, no doubt because bone chips were not used. This would suggest that the wedge-shaped grafts remained in position in spite of the fact that there was no postoperative fixation, an important point.

Clinical Results.—Sixteen lumbosacral fusion operations were performed, 1 in the cervical portion of the spine. The indications of the former were chronic low back pain, with or without herniated discs; the cervical fusion was performed for a fracture dislocation and included only two vertebrae. The most recent of these was performed one year and the oldest seven years prior to the time of writing. Only 8 cases could be followed for over one year. Of these, the clinical results were good in all but 1, the one failure occurring in a lumbosacral fusion which was later reoperated on elsewhere. Since roentgenograms are not always reliable in detecting a pseudoarthrosis, operative inspection at a later date should be performed to make certain of the success of fusion. This was not done, as the patients were clinically relieved and the postoperative roentgenograms appeared satisfactory.

Comment.—A good method of spinal fusion should meet certain criteria, namely, good mechanical and physiologic principles, simplicity and good clinical results. It is my opinion that the wedge graft method meets these requirements and has some specific advantages, for the following reasons:

1. The graft is a continuous piece of bone in close contact with its host in several places.
2. The areas of raw laminar bone in contact with the graft are relatively large.
3. The contact of the graft with the host is good, and a minimal amount of space has to be bridged by granulations and new bone.
4. There is internal fixation by reason of a wedge being driven into a cleft.
5. No foreign matter, such as screws or plates, is used, to become troublesome later or to cause local reaction.
6. Since compression of the fragments in a fractured bone appears to result in more rapid union, the same principle could be expected to operate in an area of arthrodesis where a wedge is driven into a cleft.

Final evaluation of this method must await further experience in larger series of cases.

SUMMARY

A preliminary report is presented of a spinal fusion technic in which wedge-shaped iliac grafts are inserted into laminar clefts, this operation being supplemented by other conventional procedures. The operation has been performed seventeen times.

RESUMEN

Se presenta una comunicación preliminar sobre una técnica de fusión vertebral en la cual los injertos ilíacos en forma de tabique se insertan en las hendiduras laminares. Esta operación se completa por otros procedimientos convencionales. La operación ha sido realizada diez y siete veces.

ZUSAMMENFASSUNG

Es liegt ein vorläufiger Bericht über eine Technik der Wirbelsäulenfusion vor, bei der ein keilförmiges Knochentransplantat aus dem Hüftknochen in die Spalten der Laminae eingepflanzt und danach die Operation durch andere ubliche Verfahren vervollständigt wird. Die Methode ist siebzehn Mal angewendet worden.

RIASSUNTO

Nota preliminare in cui viene descritta una tecnica di artrodesi vertebrale in cui viene usato un innesto osseo ricavato dalla cresta iliaca e inserita fra le lamine. Tale intervento è stato eseguito in diciassette casi.

RÉSUMÉ

Un rapport préliminaire est présenté concernant une technique spéciale où l'auteur, pour obtenir une fusion spinale, utilise des greffes iliaques en forme de coin.

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Herniation of the Intervertebral Disc

Diagnosis, Treatment and Resume of Follow-Up Study

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AND
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THE purpose of this paper is to present a group of cases carefully followed over a period of years, with the conclusions drawn from this survey. Already the controversial literature on the subject is astounding; but only by a constant analysis of indications, contraindications, diagnostic procedures, cardinal signs and symptoms, operative technic and methods, will the matter ultimately be placed in its proper category of importance.

Only the analyses of the cases observed since 1947 are presented in this study because, from this period on, the ideas became more or less crystallized and have been maintained without radical changes, while the groping period from 1935 to 1947 was a period of personal metamorphasis through which the transition of judgment was filled with trials and errors. This report is based on 115 operations on 113 patients.

Everyone realizes that the cause of backache with sciatic nerve irritation is variable, and no attempt will be made to discuss the differential diagnosis; this paper will be limited to the problem of the herniated disc in the lumbar area.

The senior author makes an average of about 1,200 to 1,400 back examinations a year (8,400 to 9,800 during the period of this survey), and of this group only 113 patients have been operated upon for herniated discs since 1947, which indicates that the general trend of treatment has been ultraconservative.

Surgical intervention is indicated when the clinical and roentgen studies are definite. If there is any question in one's mind, conservative management should be tried first. If this is unsuccessful in improving the patient, then an exploration should be undertaken.

Each surgeon has his own ideas as to the criteria that strongly indicate the presence of a disc. Our ideas are as follows:

History. — There usually is a definite history of stress, strain or accident to the lower part of the back. This may be a single injury or the result of repeated episodes. This is followed by low back pain, with or without sudden radiation of the pain down the leg. In some instances the sciatic nerve radiation develops several days after the trauma. Exacerbation of the pain and discomfort usually follow coughing and sneezing. As a rule, sensation along the nerve root distribution of the calf and foot is decreased or absent.

Physical Data.—Typical of the physical abnormalities is muscle spasm in the lumbar area, associated with localized pain in the lumbosacral region and limitation of back motions. This may or may not be associated with scoliosis or loss of the normal lumbar lordosis.

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Submitted for publication Sept. 24, 1954.

In the more advanced stages a limp is often present in the affected leg, and in the classic cases the "disc triad," is present: (1) atrophy of the affected leg; (2) decreased or absent achilles reflex, and (3) hypesthesia or anesthesia along the distribution of the nerve root undergoing pressure.

Unless at least two of the three neurologic signs exist, one should be exceptionally careful in diagnosing nerve root pressure from a herniated disc.

The Lesague (straight leg raising) and Kernig tests usually give positive results of varying degrees, depending on the extent of the herniation and nerve root pressure.

In our series the neurologic signs and sciatic nerve stretching are as listed in Table 1.

As a rule the standard anteroposterior, lateral and oblique roentgen views of the lumbar portion of the spine show no disc space changes or bony lipping. However, in old cases degenerative changes in the disc may show some narrowing of the disc space or associated bony lipping or marginal sclerosis. Since in most cases of herniated disc the condition is acute, these changes are usually absent.

Total protein studies of the spinal fluid have been discontinued, since the results were inconclusive.

Myelographic study, on the other hand, has been one of the most reliable of the diagnostic tests. Occasionally the results were inconclusive or misleading, but as we gained experience the value of the myelogram steadily increased.

TABLE 1.—*Signs Indicating Herniated Disc*

	Present		*Absent*	
	No. of Cases	*%*	*No. of Cases*	*%*
Reflex changes (achilles; patellar)	68	59.1	47	40.9
Sensory changes	72	62.6	43	37.4
Atrophy	106	92.1	9	7.8
Lesague	112	97.4	3	2.6
Kernig	111	96.5	4	3.5

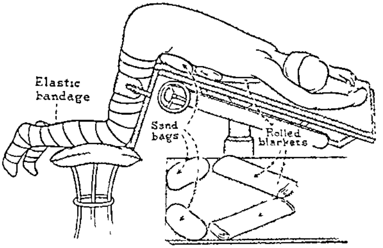

Fig. 1.—Patient on operating table in prone position with sandbags and rolled blankets to permit normal venous return from the legs and good respiratory excursion. Legs are wrapped with elastic bandages from toes to groin to prevent pooling of blood in the legs. An operating room stool and pillow are used to support the legs

The accuracy of this test is shown in Tables 2, 3 and 4. These data apply only to the patients who ultimately came to operation. Several hundred who were not subject to surgery, of course, could not be tabulated; but, in view of the fact that they were normal and clinically improved to such a degree that operation was not considered, it is fair to assume that the relation between the normal myelogram and the clinical course of the patient showed a high degree of accuracy.

A few words on our myelographic technic may be helpful to those who have not had a broad clinical experience.

Six cc. of Pantopaque is used. Lipiodol is too irritating and air too uncertain. Skiodan (abrodil) causes severe pain, requiring general anesthetic, and is associated with unnecessary dangers. This preparation, however, is preferred by some in the Scandinavian countries.

The patient is placed face down on the fluoroscopic table, with the feet against the footboard. A modera [illegible] d pillow is placed under the ant [illegible] r spi [illegible] to flatten the nor

The skin is carefully prepared by washing with hexochlorophine and water for five minutes. Then ether and merthiolate or mercresin are used to paint the skin. The field is carefully walled off with a sheet having a three-inch (7.5 cm.) circular hole in the center.

The surgeon has prepared his hands by washing them and covering them with sterile gloves. We prefer to do the spinal puncture at the third and fourth lumbar level, to prevent the needle point from causing a false positive reaction in the area where herniation of a disc is suspected. The skin and underlying structures are infiltrated with 2 per cent procaine hydrochloride.

We have found the BD spinal needle (16 gauge, 3½ inches long, No. 461LNRC) the best for doing the spinal puncture and subsequently withdrawing the Pantopaque.

The spinal puncture is next done, with the patient face down without movement, and after the 6 cc. of Pantopaque has been injected the abdominal pillow is removed. The needle is never removed during the procedure, as its removal would only complicate matters. One might not be successful the second time in getting it into the subdural space, not to mention the additional trauma to the tissues and pain to the patient.

The patient is now tilted up and down on the roentgen table; fluoroscopic studies are made and spot films taken. This includes anteroposterior, lateral and oblique views.

At the termination of the study the Pantopaque is localized under the tip of the needle, and. with the patient holding his breath and bearing down, the oil is pushed out. Occasionally pressure on the jugular veins is needed to increase the intraspinal pressure. The use of syringe suction on the needle frequently draws a nerve root or a piece of dura against the needle opening and stops the flow of fluid. When a nerve root is sucked against the needle tip it causes a great deal of pain to the patient.

In most instances all of the Pantopaque is removed. Should some be left behind, no harm is done, since it is a nonirritating substance. Its absorption is slow, and subsequent films of the back reveal its presence. Fewer questions are asked, however, if it is all successfully withdrawn.

The patient is kept flat in bed for twenty-four to thirty-six hours, to avoid postspinal puncture headaches.

Treatment.—Should there be any question about the correct diagnosis, conservative treatment is indicated until the patient either improves and requires no further treatment or becomes worse and operation is performed.

Once the diagnosis of a disc herniation is established, operation, in our opinion, is the only method of obtaining a cure.

Conservative management consists of immobilization in a torso cast for six weeks, with administration of salicylates and ascorbic acid by mouth and some form of codeine for pain. Limited activity and rest are insisted upon.

When the cast is removed, graduated exercises and physical therapy in the form of heat, massage and muscle building exercises are recommended, as well as sleeping on bed boards and avoidance of stooping and lifting. The administration of salicylates and ascorbic acid is continued.

Prior to operation the condition of every patient must be carefully evaluated. If he or she is emotionally unstable, or there is any question about a neurotic or psychotic background, psychiatric help should be sought; it is far better to let the case go elsewhere than to operate and have many months of headaches and heartaches to follow. On several occasions the senior author (C. S.) has operated on mildly psychotic patients with actual pathologic discs, but the exacerbation of the psychosis has so overshadowed the removal of the disc condition that the end results were most unfavorable. Five patients with such backgrounds were operated on in this series, amounting to 4.4 per cent.

Every surgeon has his own procedure for operating on a herniated disc. Many technics have been tried over the years, with the final crystallization of the technic as herewith described. It represents observation of the work of others, personal trials and errors, some original ideas, and the amalgamation of years of experience.

The anesthesia as well as the positioning of the patient on the table is very important. We start the induction with sodium pentothal, and then, after intubation, nitrous oxide or ether, ethylene or cyclopropane is given at the discretion of the anesthetist. Transfusions are given only if a spinal fusion is to be performed and the clinical condition of the patient warrants it.

While the patient is still on his back, the legs are wrapped snugly with elastic bandages from the toes to the upper third of the thighs, so that when the patient is turned face down with the hips and knees bent there will be no pooling or stagnation of blood in the legs.

The operating table is fixed with two sandbags at the break of the table, where the anterior superior spines are to rest. These sandbags should be about 4 by 3 by 10 inches.

Two long cotton blanket rolls are made, and these are set on the table so as to be closer together at the head and wider at the abdominal end, so that when the patient is turned face down the abdomen and chest are free. The sandbags prevent impairment of venous return from the legs, pelvis and abdomen, while the rolled blankets permit better respiratory excursion. Correct placement of the sandbags and blanket rolls forms a diamond-shaped area in the center of the table (Fig. 1).

The patient is turned face down from the cart to the operating table, care being taken to make sure that the anterior superior spines of the pelvis rest on the sandbags just proximal to the break of the table. The foot end of the table is then let down to right angles, and the patient's knees are bent and supported on a stool padded with a pillow. The head end of the table is next lowered about 8 to 10 inches (20 to 25 cm.) to permit better venous drainage. The legs are then strapped to the table and the stool adjusted so that the knees are resting comfortably on the pil-

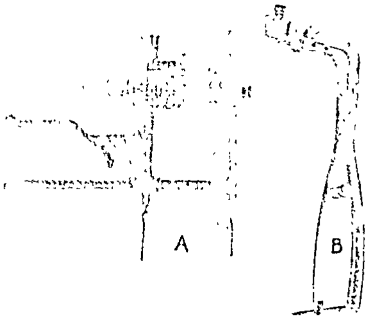

Fig. 2.—*A*, Glasser muscle retractor; *B*, Scuderi interspinous spreader.

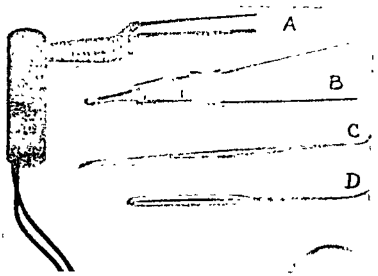

Fig. 3.—*A*, Scuderi electroco[illegible] bayonet forceps; *C*, modified tonsil pil[illegible] used as a double-ended root [illegible] dural [illegible]

low. The surgeon should be able to pass his hand under the abdomen and chest before the patient is scrubbed, to be sure there is no interference with respiration (Fig. 1).

The back is then extensively washed for five minutes with hexachlorophine or Septisol, followed by ether and a mercurical skin antiseptic. The field is carefully walled off with towels, sheets and finally a lap sheet, so that the total operative field is about 6 by 12 inches (10 by 33 cm.).

The skin, fat, muscle and fascial planes are locally infiltrated with a solution of epinephrine 1:1000 (10 minims to 1 ounce of physiologic solution of sodium chloride) for local hemostasis. This is a priceless adjunct when a clear field is desired at the bottom of the incision.

A midline incision is used, low enough to enable one to identify the first sacral segment, then extended upward to the level desired. Unless this is done, sooner or later one is operating at the wrong level, with considerable loss of time and failure to find the pathologic disc.

The posterior bony ridge of the sacrum and the posterior spinous process of the fourth and fifth lumbar vertebrae are carefully isolated by subperiosteal dissection of the overlying muscle bellies. At each level gauze strips are packed until each side has been dissected clear. This aids in hemostasis. Then the subperiosteal dissection is carefully and completely made over the area to be exposed. Regardless of the time required, it is most important to secure accurate hemostasis before one proceeds further. The electrocoagulator (to be described later) is a most valuable adjunct, as it reaches deep bleeders easily and is a great time-saver. The Frazier aspirator is essential for maintaining clear visualization of the field (Fig. 6). Mechanical retractors are now inserted to keep the field well exposed (Fig. 2).

When the proper interspace is identified, the posterior spinal ligament is carefully removed (with a minimal amount of bone) from the posterior spinous processes adjoining the interspace to be explored, until the ligamentum flavum is reached. With a small curet the ligamentum flavum is loosened from its attachment to the laminae; then, with a long thin-bladed scalpel, the ligamentum flavum is cut longitudinally in its center and the ligament carefully dissected with the curet from the medial to the lateral aspect. Figure 3 shows the special instruments we use to obtain better exposure of the disc. A cotton pledget and a dural retractor are inserted to make sure that the dura and nerve roots are not damaged. The ligamentum flavum on the side to be exposed is removed as completely as possible with curets and a Kerrison rongeur. A small amount of the laminae may be removed with a Kerrison rongeur (Fig. 6*A*) to insure visibility if more space is required (Fig. 4). The field is then packed off, by the placing of a cotton pledget saturated with the epinephrine solution, cephalad and caudad to prevent oozing into the field. The nerve root is now carefully identified, and then, with dural retractors, the interspace is carefully explored by retraction of the nerve root, the dura and the cauda equina to one side (Fig. 5).

Once the herniated disc is found, it is carefully removed with 8-inch (20 cm.) pituitary punches. Three are used: one opens away from the surgeon (Fig. 6*B*); one is straight (Fig. 6*C*), and one opens toward the surgeon (Fig. 6*D*). In this way practically all aspects of the disc can be reached. If the disc has already ruptured through the posterior longitudinal ligament it is not necessary to incise the latter. If it has not, the ligament is cut longitudinally and the herniated disc permitted to herniate into the subdural space.

Troublesome bleeding is checked or stopped by pressure with the cotton pled-

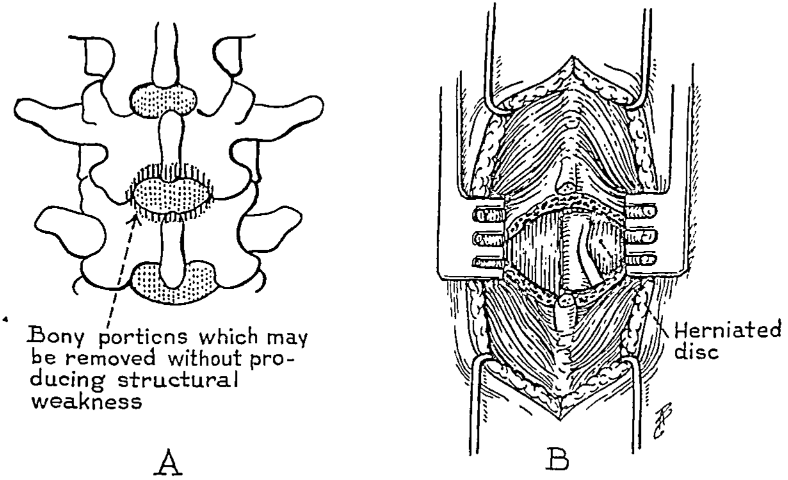
Bony portions which may be removed without producing structural weakness
A
Herniated disc
B

Fig. 4.—*A*, amount of bone that may be removed with a Kerrison punch to give better exposure without structurally weakening the back. *B*, surgical appearance of area when disc and nerve root are exposed.

gets, the electrocoagulator or gelfoam.

Central discs are removed by going in on both sides, by retracting the dura first to the right and then to the left or vice versa. At no time have we found it necessary to proceed transdurally, and we have performed no laminectomy in years, since it weakens the back mechanically and is not necessary if the interlaminar approach is used by one experienced in this method.

Wide removal of bone with resection of the articular facet, used by some with the pretense that a more thorough investigation is being done, is to be condemned because of the spinal instability it creates.

Gelfoam is used to control any oozing and to cover the dura in the area where the ligamentum flavum was removed.

A snug postoperative bandage of elastoplast is used to help stop any oozing. Morphine or codeine is given for pain, and one of the antibiotics is used as a prophylaxis against infection. The patient may be turned as much as he desires, and the back rest of the bed can be raised or lowered

TABLE 2.—*Results of Roentgenographic and Myelographic Examination, 1947 to 1951 (Number of total Operative Cases, 51)*

Results of Roentgen Examination	*Study of Discs*	*Number of Cases*	*%*
Positive	Positive	37	72.5
Positive	Negative	9	17.6
Negative	Positive	3	5.9
Negative	Negative	2	3.9

Accuracy of 76.5%

TABLE 3.—*Myelograms, 1951 to 1954 (Total Number of Operative Cases, 62)*

Results of Roentgen Examination	*Study of Discs*	*Number of Cases*	*%*
Positive	Positive	55	87.3
Positive	Negative	3	4.7
Negative	Positive	3	4.7
Inconclusive myelograms		2	3.2

Accuracy of 90.4%

TABLE 4.—*Total Myelographic Statistics from 1947 to 1954*

Results of Roentgen Examination	*Study of Discs*	*Number of Cases*	*%*
Positive	Positive	92	80.7
Positive	Negative	12	10.5
Negative	Positive	6	5.3
Negative	Negative	2	1.75
Inconclusive	(bloody taps)	2	1.75
Accuracy of 82.4%			

TABLE 5.—*Compensation Cases*

Results	*Number of Cases*	*%*	
Excellent	27	44.3	82.0%
Good	23	37.7	
Fair	8	13.1	
Poor	3	4.9	
Male patients	58		
Female patients	3		
Total	61		

TABLE 6.—*Noncompensation Cases*

Results	*Number of Cases*	*%*	
Excellent	31	59.6	80.8%
Good	11	21.2	
Fair	5	9.6	
Poor	5	9.6	
Male patients	35		
Female patients	17		
Total	52		

TABLE 7.—*Level of Herniated Disc*

Level of Disc	*Number of Cases*	*%*
L-5 S-1	52	47.7
L-4 L-5	55	50.5
L-3 L-4	2	1.8

as he or she wishes. At the end of forty-eight hours the patient is permitted to go to the bathroom with help, and in a few days he can be up and about as much as he desires.

Return to light work is permitted within four to six weeks if the patient is so inclined. Heavy work is avoided for ten to twelve weeks in the average case, provided no fusion has been done.

If a fusion has been undertaken, heavy work should not be done until the fusion is solid. This usually requires about six months from the time of operation.

Fusion Versus Nonfusion. — A great deal of controversy exists on this subject, not only between neurosurgeons and orthopedists but among orthopedist surgeons themselves. The question of whether or not a spine be fused confronts every surgeon who performs disc operation. The pros and cons of this problem in all of its ramifications are beyond the scope of this paper.

It is our opinion that an associated spinal fusion should be done if one or more of the following indications exists:

1. Hemilaminectomy or total laminectomy performed in the removal of the disc.
2. Spondylolisthesis.
3. Spina bifida.
4. Sacralization of a transverse process, with evidence of a false joint.
5. Marked bony osteophytes in the area.
6. Marked marginal sclerosis of the contact bony surfaces just above and below the disc area.
7. A loose, unstable fifth lumbar vertebra observed at operation and diagnosed by its excessive motion on instrument pressure.

We have ceased doing spinal fusions when no pathologic change is detected in the disc and none of the previously men-

TABLE 8.—*Location of Herniated Disc*

Location	*Number of Cases*	*%*
Left side	56	51.4
Right side	46	42.2
Central	7	6.4

TABLE 9.—*Type of Operation; Number of Cases*

Results	*Disc Alone*	*Fusion-No Discs*	*No Disc-No Fusion*	*Disc and Fusion*
Excellent	52	1	1	4
Good	25	2	1	4
Fair	6	2	2	4
Poor	2	0	4	3
Total	85	5	8	15

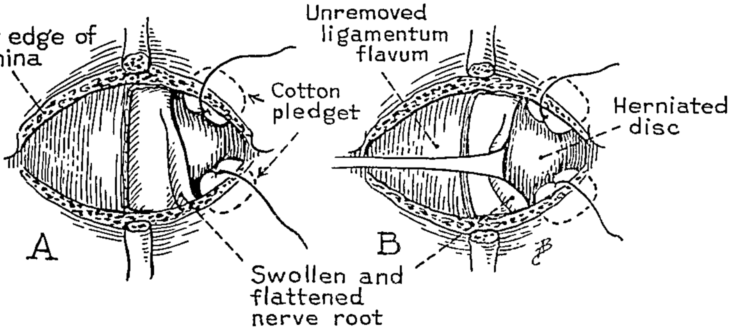

Fig. 5.—*A*, nerve root exposed. Area packed off with epinephrine-soaked cotton pledgets. *B*, use of the nerve root retractor to obtain complete exposure of the herniated disc and at the same time protect the nerve root.

tioned indications exist. The hope that spinal fusion will cure backache with pain radiating to the legs is an illusion. It subjects the patient to an operation that carries a relatively high incidence of failure; it is painful, and it prolongs convalescence. If the patient has a low pain threshold, or if he is neurotic or psychotic, the symptoms only become magnified, as we have unfortunately learned on several occasions.

In uncomplicated cases the interlaminar removal of the disc brings rapid recovery, a minimum amount of pain and a high percentage of successful outcomes.

When a spinal fusion is indicated, the Hibbs type is preferred. We use iliac bone grafts taken from the wing of the ilium. The articulations are removed and packed with bone chips. With Hibbs gouges and curved Smith-Petersen chisels, chip grafts are turned down from the posterior spinous processes and the laminae. This makes a good bone bed into which to lay the grafts. The posterior spinous processes are not cut off, as this additional bone provides more area for contact with the grafts, and the spinous processes act as a mechanical bony rudder.

The curving of the original longitudinal incision over the posterior superior spine of the ilium makes it possible to expose the wing of the ilium without the possible complication of a painful scar over the wing when the cluneal nerves are cut in making a second incision.

A subperiosteal dissection along the crest of the ilium over the posterior superior spine to the posterior inferior spine exposes an area of bone about 4 by 4 inches (10 by 10 cm.). From this area one can remove 10 to 12 succulent pieces

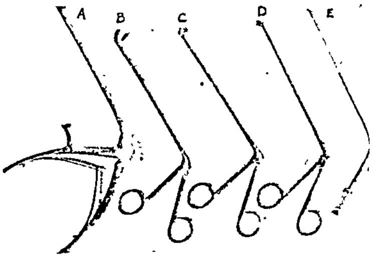

Fig. 6.—*A*, Kerrison punch; *B*, 8-inch pituitary punch opening away from the surgeon; *C*, 8-inch pituitary punch, straight; *D*, 8-inch pituitary punch opening toward the surgeon; *E*, 8-inch Frazier aspirator.

of bone about the size of a little finger and about half as thick. This is more than enough bone to fuse two vertebrae to two sacral segments.

The grafts are laid along the bed that has been created on each side of the posterior spinous processes. They are overlapped like the shingles on a roof, and an occasional graft is placed transversely across the interspinous spaces.

Postoperatively sedation and antibiotics are given, and at the end of five to seven days bathroom privileges are permitted, with graduated walks.

At the end of fourteen to sixteen days the patient is permitted to go home without a cast or brace. No form of strenuous activity is permitted until the fusion appears solid, which usually takes about six months. Iliac bone grafts do not break, and they produce a solid fusion in a shorter time than do cortical tibial bone grafts, which require a longer period to become revascularized. Tibial grafts tend to become displaced, unless a torso cast is applied, and will break if much strain is put on them. Regardless of these two objections, many surgeons use tibial grafts with excellent end results.

Twenty fusions were performed in conjunction with the disc operation (17.7 per cent) of the cases. Of these 20 cases, the diagnosis of pseudoarthrosis was made in 1, classing it as a failure (5 per cent).

The results in the cases of operation with spinal fusions were not as good as those obtained with simple disc removal, perhaps because the original pathologic condition fell under one of the aforementioned indications for spinal fusion.

End Results.—Of the 113 patients, 2 required secondary operations, raising the total for the series to 115 operations.

These patients have been followed for periods of six months to seven years. Patients who were lost track of and records that were incomplete for this study were not included.

No great difference was observed between compensation and noncompensation cases, as far as excellent and good results were concerned. This is directly opposite to results published by a number of other authors.

The results are as tabulated below. For uniformity of classification the following criteria were used:

Excellent: Complete return of function, unlimited activity, no pain and return to former occupation.

Good: Complete return of function, slight discomfort under heavy activity, and return to former occupation without loss of time.

Fair: Some restriction of function, some discomfort under heavy activity and return to a type of work not entailing heavy activity.

Poor: No improvement or aggravation of preoperative symptoms, pain and discomfort under moderate or slight activity, gainful occupation impossible because of the back condition.

A comparative analysis of the excellent and good results in the compensation and noncompensation cases was only 1.2 per cent, with the compensation cases having the slightly more favorable edge. So far as this series is concerned, we are not of the opinion that the compensation patients tended to exaggerate their poor postoperative condition, although all will agree that at times there might be a desire to do so for economic reasons.

In the detailed analysis of these cases the results did not vary noticeably between the sexes. The tables of these comparative figures were omitted for simplification.

In this series only 8 patients, or 7.3 per cent, had double discs.

In 113 operative cases, 109 herniated discs were found.

The distribution of the disc at the fifth lumbar and first sacral level and the fourth and fifth lumbar levels were almost equal (Table 8).

Table 7 is a breakdown of all the cases with regard to what was done and what the end results were. They can hardly be compared, because the pathologic conditions and the indications were different. The figures, however, have been compiled for what they are worth, and each reader will be left to draw his own conclusions.

As a rule, when a large herniated disc was found pressing on a nerve that was thickened and flattened, the results were outstandingly favorable. When no disc was found, regardless of whether or not a fusion was performed, we considered the end results precarious. For this reason, if for none other, operation for a herniated disc should not be done unless one has definite evidence that a herniation exists. The indiscriminate surgical intervention or the optimistic outlook of the surgeon, does not compensate for judgment, accurate diagnosis and surgical skill. Surgical therapy for the discs has fallen into some disrepute, not because of any contraindication but because of errors of surgical judgment.

CONCLUSIONS

1. A careful review is presented of 115 operations on 113 patients with herniated intervertebral discs. The follow-up periods range from six months to seven years.
2. The authors present their ideas on diagnosis and treatment. This includes operative and nonoperative therapy.
3. The surgical technic and special spinal instruments for performing the procedure are shown.
4. The technic and diagnostic accuracy of myelographic study are discussed in relation to operative cases in the authors' series.
5. The indications for fusion and nonfusion are presented, with 20 cases, or 17.7 per cent, of associated fusions.
6. The end results classified as excellent to good were as follows: compensation cases, 82 per cent; noncompensation cases, 80.8 per cent.

RIASSUNTO

1. Accurato resoconto di 115 interventi praticati per ernia del disco su 113 pazienti, seguiti poi per periodi di tempo varianti da sei mesi a sette anni.
2. Gli autori espongono le loro idee sulla diagnosi e sulla cura, operatoria o meno.
3. Vengono illustrati la tecnica chirurgica e gli strumenti speciali usati per eseguirla.
4. Vengono discusse la tecnica e la precisione diagnostica delle ricerche mielografiche al lume dei reperti ottenuti nei casi operati.
5. Vengono esposte le indicazioni della fusione e quelle della non fusione, con 20 casi (17,7%) di fusione associate.
6. Nei risultati finali classificati come ottimi e buoni, si ebbopo le percentuali seguenti: casi compensati 82%; casi non compensati 80,8%.

RESUMEN

1. Se presenta una revisión cuidadosa de 115 operaciones en 113 pacientes con hernia del disco intervertebral. Los períodos de evolución variaron de seis meses a siete años.
2. Los autores presentan sus ideas acerca del diagnóstico y tratamiento, incluyendo este último la terapeútica quirúrgica y la no quirúrgica.
3. Se muestran la técnica quirúrgica y los instrumentos medulares especiales.
4. Se comentan la técnica y valor diagnóstico del estudio mielográfico en relación con los casos oper [illegible]
5. Se presenta [illegible]

fusión ó ausencia de esta, sobre 20 casos de fusión (17.7 por ciento).

6. Los resultados finales clasificados de excelentes a buenos fueron como sigue: casos compensados, 82 por ciento; casos descompensados, 80.8 por ciento.

RÉSUMÉ

1. Les auteurs passent en revue 115 opérations pratiquées sur 113 malades atteints de hernies discales. La période d'observation va de six mois à sept ans.

2. Les auteurs exposent leurs idées personnelles sur le diagnostic et le traitement (opératoire et conservateur).

3. Démonstration de la technique chirurgicale et des instruments spéciaux qu'elle nécessite.

4. Discussion de la technique et du diagnostic myélographiques.

5. Présentation de 20 cas avec indication de la "fusion" et de la "non fusion" (17,7% avec fusion associée).

6. Résultats finaux: cas "compensés," 82%, non "compensés," 80,8%.

SUMARIO

1. É apresentada pelo A. uma cuidadosa revisão de 115 operações feitas em 113 pacientes com hernias de disco intervertebral. Os períodos de "follow up" situam-se entre 6 meses e 7 anos.

2. Os AA. apresentam suas ideias sobre o diagnóstico e o tratamento, o qual inclui metodos cirúrgicos e não cirúrgicos.

3. São apresentados os instrumentos especiais usados e a técnica cirúrgica seguida.

4. A técnica e a acuracidade diagnóstica do estudo mielografico são discutidos em relação com os casos operatórios da série dos AA.

5. São apresentadas as indicações para a fusão ou não fusão, com 20 casos, ou 117,7 por cento, de fusões associadas.

6. Os resultados finais classificados como excelentes e bons foram os seguintes: casos de compensação, 82%; casos de não compensação, 80,8%.

ZUSAMMENFASSUNG

1. Es liegt eine sorgfältige Analyse von 115 Operationen vor, die an 113 Kranken wegen Vorfalls von Zwischenwirbelscheiben ausgeführt wurden. Die Nachbeobachtungen erstreckten sich über einen Zeitraum von 6 Monaten bis zu 7 Jahren.

2. Die Verfasser legen ihre Auffassung von der Diagnose und Behandlung der Erkrankung einschliesslich chirurgischer und nicht operativer Massnahmen dar.

3. Sie beschreiben die chirurgische Technik sowohl wie besondere spinale Instrumente, die sie verwenden.

4. Die Technik und die diagnostische Zuverlässigkeit myelographischer Untersuchungen werden mit Beziehung auf die operativen Fälle der Verfasser erörtert.

5. An Hand von 20 Fällen (17,7%), bie denen gleichzeitig eine Fusion vorgenommen wurde, werden die Indikationen zur Fusion und zu ihrer Vermeidung dargestellt.

6. Die als ausgezeichnet bis gut klassifizierten Endergebnisse betragen 82% bei Fällen mit Entschädigungsansprüchen und 80,8% bei solchen ohne Entschädigungsansprüche.

Normal Extracellular Fluid Volume

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WHILE studying the changes in extracellular fluid volume subsequent to surgery as a stresser, by our own method,[1] it became necessary, owing to the paucity of the published values of the normal and the extreme variation in the few studies that have been reported, to determine the normal volume.

Method.—We divided our subjects arbitrarily into "old" and "young" normal persons and subdivided these into male and female. "Old normal" designates a subject whose apparent age was over 45 years, while "young normal" included persons from puberty to the age of 45 years.

The large variable factor in these and other studies of human beings when one wishes to arrive at a "base line" of normal is the amount of fat a subject has. Fat is an anhydrous tissue, and whatever water it does have is "bound water." Metabolic activity in adipose tissue is very low; hence, oxygen uptake also is minimal. The blood and plasma contents of fat are also low. Any attempt to express the extracellular fluid volume, plasma volume or even oxygen uptake as a function of total body weight or body surface area, without consideration of the variations in fat from person to person, will result in an erroneously wide range of so-called normal persons and will be of little use for comparative purposes.

In the present communication, as well as in our cardiopulmonary work,[2] we are seeking a rational and simple solution to this problem. By expressing the expression

$$S = 1.1094 - 0.0119\,E$$

where S = specific gravity
E = endomorph rating (vide infra[3])

and, substituting the value of S thus obtained in the equation,

$$\%\ \text{Fat} = 100\left(\frac{5.548}{S} - 5.044\right),$$

one can arrive at an accurate figure for the percentage of fat of the subject under study.[4] The fat mass can now be calculated and subtracted from the total body weight to give the "lean muscle mass."[3] "Lean muscle mass" is used here to include bone and visceral mass as well, because these are relatively constant.

These relations were determined for male subjects. Similar studies on the fat content of the normal female body are in progress but have not yet been published. Probably it will be found that there is a slightly greater percentage of fat in the female, roughly 5 per cent judging from our work, in which case the only change will be in the value of the constants in the aforementioned equation. When these studies have been carried out, the values given in our present work may then be recalculated. Sufficient data are given, should it become necessary, to make these calculations for the female. *E* is the degree of endomorphy or soft body roundness of a subject. It refers specifically to

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept 6-10, 1954

Submitted for publication Sept. 24, 1954

the amount of fat present in relation to his muscle mass. A person with no apparent fat has an endomorph rating of I, while one with a great excess of fat has a rating of VII; IV would represent an average.

Results.—The details on 59 consecutive normal subjects studied are presented. The headings of the tables are self-explanatory. The subjects were picked from the Outpatient Department of the Second Surgical Division of Bellevue Hospital from 1952 to 1953. Approximately 500 determinations of extracellular fluid volume were made on about 100 patients studied and resulted in data similar to those reported here.

In the accompanying tables, "Type" refers to the endomorph rating of the subject's somatotype; ECF designates extracellular fluid volume, including plasma volume, in milliliters; "% Wt." is the volume of extracellular fluid per kilogram of body weight, and "% LMM" is the volume of extracellular fluid per kilogram of lean muscle mass. It will be noted that extracellular fluid volume expressed as a percentage of lean muscle mass is approximately 3 per cent higher than when expressed as a percentage of total body weight; it is also slightly higher (0.4 to 0.7 per cent) in the "old" adults than in

TABLE 1.—*Male Subjects, Young (Under 45)*

Patient	*Age*	*Type*	*Total Wt., Kg.*	*Fat Wt., Kg.*	*LMM, Kg.*	*ECF, Ml.*	*Wt., %*	*LMM, %*
G.S.	18	4	60	10.9	49.1	11.3	18.9	23
A.M.	19	4.5	70.1	14.8	55.3	13.2	18.8	23.8
O.S.	17	2.5	48.2	4.5	43.7	9.670	20	22.1
E.M.	25	3	75.3	9.3	66	13.575	18	20.5
A.K.	36	5	69.5	16.7	52.8	11.1	16	21
C.K.	41	3	67	8.2	58.8	14.55	21.7	24.8
J.B.	34	4	73.2	13.3	59.9	13.5	18.4	22.6
W.B.	23	3	65.4	8	57.4	12.8	19.6	22.4
J.L.	33	3	70.5	8.7	61.8	13.3	18.9	21.5
J.S.	31	1	55.5	0.6	54.9	10.9	19.7	19.9
E.S.	40	4.5	78.2	16.5	61.7	13.5	17.3	21
W.C.	31	4	63.7	10.6	53.1	14.3	22.5	26.9
L.M.	13	2	53.6	3.8	49.8	11	20.5	22.1
						Average	19.25	22.5

TABLE 2.—*Female Subjects, Young (Under 45)*

Patient	*Age*	*Type*	*Total Wt., Kg.*	*Fat Wt., Kg.*	*LMM, Kg.*	*ECF, Ml.*	*Wt., %*	*LMM, %*
S.K.	40	4	59.2	10.7	48.5	11.470	19.4	23.6
I.V.	33	5	66.6	16	50.6	10.500	15.8	20.7
P.T.	29	3	51.9	6.4	45.5	10.600	20.4	23.3
A.C.	41	5.5	82.7	22.4	60.3	13.700	16.7	22.7
A.D.	42	6	64.2	19.3	44.9	10.250	16.0	22
R.M.	34	3	46.2	5.7	40.5	8.920	19.3	22
E.S.	26	3	48.3	5.9	42.4	9.450	19.5	22.2
M.C.	19	2.5	50.7	4.7	46	9.280	18.3	19.9
A.R.	26	3	48.3	5.9	42.4	9.450	19.5	22.2
A.K.	30	4	46.5	8.4	38.1	7.780	16.8	20.4
						Average	18.0	21.8

TABLE 3.—*Male Subjects, Old*

Patient	*Age*	*Type*	*Total Wt., Kg.*	*Fat Wt., Kg.*	*LMM, Kg.*	*ECF, Ml.*	*Wt., %*	*LMM, %*
S.C.	69	3	59	7.3	51.7	12.100	20.5	23.4
M.O.	57	4	60.5	10	59.6	10.800	17.9	18.1
C.A.	61	3	57.7	7.1	51.6	11.980	20.7	23.2
I.S.	54	3	67.7	8.3	59.4	11.800	17.4	19.9
W.H.	60	5.5	88	23.8	64.2	14.300	16.3	22.2
D.S.	70	5	71.9	17.2	54.7	14.600	20.4	26.7
J.M.	51	6	93.4	28.1	65.3	15.400	16.5	23.5
A.R.	56	5.5	71.4	19.3	52.1	11.900	16.7	22.8
M.T.	65	3	58.2	7.2	51.0	12.400	21.4	24.5
F.K.	64	4	81.6	14.8	66.8	12.700	15.6	19
J.G.	44	2	63.7	4.3	59.4	12.900	20.3	21.6
G.E.	66	4.5	77.2	16.3	60.9	13.400	17.4	22
R.B.	53	4	74.4	13.5	60.9	16.800	22.6	27.5
J.F.	56	2	55	3.7	52.2	10.200	18.3	19.5
J.C.	50	3	67.1	8.3	58.8	14.500	21.6	24.6
G.W.	73	5	71.7	17.2	54.5	14.350	20	26.3
J.Mc	56	4	66	12	54	11.380	17.2	21.1
P.O.	46	4	85.1	15.4	69.7	19.900	23.4	28.6
G.W.	73	5	71.7	17.2	54.5	14.350	20	26.4
G.B.	51	5	75	16.9	58.1	13.600	18.1	23.3
						Average	19.12	23.21

TABLE 4.—*Female Subjects, Old*

Patient	*Age*	*Type*	*Total Wt., Kg.*	*Fat Wt., Kg.*	*LMM, Kg.*	*ECF, Ml.*	*Wt., %*	*LMM, %*
A.D.	71	5.5	66.7	18	48.7	13.300	20	27.3
K.M.	62	4	61	11	50	12.000	19.7	24
M.J.	61	1	46	0.5	46.4	9.190	19.5	19.8
A.J.	62	6	79	23.8	55.2	13.100	16.6	23.7
I.K.	58	3	44.8	5.5	39.3	10.000	22.3	25.4
M.S.	65	4.6	55	10	45	10.500	19.1	23.4
H.H.	50	2	52.8	3.5	49.3	8.650	16.3	17.5
L.L.	45	5.5	69.5	18.8	50.7	12.000	17.3	22.6
I.I.	50	5	64.8	15.6	49.2	10.000	15.5	20.3
A.J.	73	4	58.4	10.6	47.8	9.260	17.1	19.4
A.J.	62	6	79	22.9	56	13.100	16.6	23.4
M.J.	61	1	46.9	7.5	46.2	9.190	19.5	19.9
						Average	18.3	22.2

the "young" adults. On a percentile basis, the extracellular fluid volume is about 1 per cent less in the female than in the male.

SUMMARY

The normal extracellular fluid volume in the adult male is 19.2 per cent of the total body weight, or 22.9 per cent of the lean muscle mass. In the female it is 18.2 per cent of body weight, or 22 per cent of the lean muscle mass.

RESUMEN

El volumen liquido extracelular en el adulto masculino es de 19.2 por ciento del peso corporal total ó 22.9 por ciento de la masa muscular. En el adulto femenino es de 18.2 por ciento del peso corporal total, ó 22 por ciento de la masa muscular.

the amount of fat present in relation to his muscle mass. A person with no apparent fat has an endomorph rating of I, while one with a great excess of fat has a rating of VII; IV would represent an average.

Results.—The details on 59 consecutive normal subjects studied are presented. The headings of the tables are self-explanatory. The subjects were picked from the Outpatient Department of the Second Surgical Division of Bellevue Hospital from 1952 to 1953. Approximately 500 determinations of extracellular fluid volume were made on about 100 patients studied and resulted in data similar to those reported here.

In the accompanying tables, "Type" refers to the endomorph rating of the subject's somatotype; ECF designates extracellular fluid volume, including plasma volume, in milliliters; "% Wt." is the volume of extracellular fluid per kilogram of body weight, and "% LMM" is the volume of extracellular fluid per kilogram of lean muscle mass. It will be noted that extracellular fluid volume expressed as a percentage of lean muscle mass is approximately 3 per cent higher than when expressed as a percentage of total body weight; it is also slightly higher (0.4 to 0.7 per cent) in the "old" adults than in

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C.K.	41	3	67	8.2	58.8	14.55	21.7	24.8
J.B.	24	4	73.2	13.3	59.9	13.5	18.4	22.6
W.B.	23	3	65.4	8	57.4	12.8	19.6	22.4
J.L.	[illegible]	3	70.5	8.7	61.8	13.3	18.9	21.5
J.S.	31	1	55.5	0.6	54.9	10.9	19.7	19.9
E.S.	40	4.5	78.2	16.5	61.7	13.5	17.3	21
W.C.	[illegible]	4	63.7	10.6	53.1	14.3	22.5	26.9
L.M.	[illegible]	2	53.6	3.8	49.8	11	20.5	22.1
						Average	19.25	22.5

TABLE 2.—*Female Subjects, Young (Under 45)*

Patient	Age	Type	Total Wt., Kg.	Fat Wt., Kg.	LMM, Kg.	ECF, Ml.	Wt., %	LMM, %
S.A.	[illegible]	4	[illegible]	[illegible]	48.5	11.470	19.4	23.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.7	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
						Average	[illegible]	[illegible]

The Extracellular Fluid Response to Surgical Treatment

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IN a recent paper we reported a simple method of measuring the extracellular fluid volume, using a single injection of inulin.[1] Therein we presented 6 cases in which the extracellular fluid volume (ECFV) ranged from 16.6 to 22.4 per cent of the total body weight. Both sexes were studied within an age range of 13 to 62 years. We discussed the specific gravity of the body, as well as the endomorph rating and its interrelationship with the extracellular fluid volume.[2]

In order to establish the normal range of the extracellular fluid volume by the aforementioned method, determinations were made on 61 carefully selected patients from our wards and outpatient department. The complete results of this study will be presented in another paper.[3] The average value for extracellular fluid volume for these 61 subjects was 18.7 per cent of total body weight, or 22.5 per cent of lean muscle mass. These results compare favorably with those obtained by tedious and more expensive technics.[4]

The object of this report is to present the fluid changes that occurred in consecutively chosen surgical patients in Bellevue Hospital and to support the thesis that this simple method is as accurate as the longer, more cumbersome methods.

Methods.—Some 500 determinations of extracellular fluid volume were carried out on 53 operative subjects. All determinations were performed by our single-injection inulin technic. Prior to the injection, samples of blood and urine were collected from the fasting patient. One thousand mg. of inulin in 10 cc. of 0.9 per cent saline solution was given intravenously. In forty minutes another 5 cc. of blood was withdrawn and placed in a heparinized tube. In older patients this second blood sample may be drawn in 50 minutes. The patient then voided or was catheterized immediately afterwards. Inulin determinations were made on all four samples, by Schreiner's resorcinol method.[5] The amount of inuloid material in the blood and urine blanks was subtracted from the plasma and urine concentrations to obtain the true inulin values. The amount of inulin injected minus the amount excreted in the urine, divided by the plasma level in milligrams per hundred cubic centimeters gave the extracellular fluid volume in cubic centimeters.

Since we began these studies a newer method has been reported,[6] in which chromagens and dextrose are destroyed and, therefore, do not affect the inulin determinations. If this method mploy t is not necessary to tak n samples prior to injec e

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Submitted for publication Sept. 24, 1954.

ular fluid determinations can then be performed after meals and on patients with uncontrolled diabetes. This change is recommended in the procedure.

At first, a preoperative extracellular fluid level was obtained and postoperative determinations made daily, then at varying intervals, as required, for two or three weeks thereafter. All infusions were carefully noted, especially blood, sodium and potassium. The clinical status of the patient and the total fluid intake and output by all routes were recorded when indicated and correlated with changes in weight.

Results.—Surgical stress through neurogenic and humoral[7] activators causes the adenohypophysis to increase its output of corticotrophins. This, in turn, results in an increased liberation of corticoids and other "secretants" if the adrenal gland is functioning. These corticoids cause an increased tubular resorption of sodium and water lasting one to seven days, while one of the secretants causes a cellular permeability change (*vide infra*). There are other factors, such as the somatotrophic hormones and posterior pituitary antidiuretic hormones, the exact significance of which in the post-stress metabolism is not known.[8] Volume receptors may exist and play an important role in body fluid control.

It is noteworthy from a clinical point of view that there must be a reevaluation of the "sodium paradox" phenomenon. The paradox is the observation of a low or falling plasma sodium level in the face of a positive sodium balance. This has been reported by others. It was explained as [illegible] intracellular shift of sodium. [illegible] will be discussed [illegible]

[illegible]

and loss of weight. As the patient recovers, these conditions all reverse themselves in two to fourteen days, depending upon the extent of the trauma.

The table is a brief summary of the pertinent points concerning each patient. "Type" refers to Sheldon's classification of somatotypes.[2] "ECF Change" is the change expressed as a percentage of total body weight; "O" indicates that no pathologic change was observed. The symbol "*" indicates that for one reason or another, such as a holiday, staff illness, accidental voiding by the patient in the bathroom or a technical mishap, determination for first or second postoperative day was not obtained and all subsequent determinations were normal, i.e., there was no postoperative rise in the extracellular fluid volume on the days studied. In some of these few cases it is possible that a transient rise occurred and was missed. Only 1 patient in this consecutive series was discarded and is not reported on, other than to mention that the studies in his case were of no value. This patient had prostatic hypertrophy with partial obstruction and residual urine. Since we did not realize this until too late in the studies and therefore did not obtain samples of catheterized urine, our urine inulin levels were erroneous.

A representative group of graphs showing the normal metabolic response to operation without complications is shown. The abscissae represent postoperative time in days, and the ordinates designate the extracellular fluid volume expressed as percentage of total body weight.

We noted that there was an increase in the extracellular fluid volume of about 3 per cent of total body weight, or approximately 2,[illegible] ml., in those subjects who underwent minor surgical procedures. This increase occurs at once and lasts one [illegible] days, after which the volume returns to normal levels. There is a small group of patients in whom the extent of trauma is so small with respect to the stamina of the patient that the "stress trigger mechanism" is not set in motion, and no increase in extracellular fluid takes place. In those subjects who underwent major operations, the increase in the extracellular fluid volume, expressed as percentage of total body weight, was more in the order of 9 per cent, or about 6,000 ml. We have consistently observed that this postoperative increase in extracellular fluid is independent of the output of urine if there is any renal function.

Specific Interpretation of Complicated Cases.—The main problem of the surgeon today is that of the metabolic and nutritional status of his patient. Surgical diagnosis, asepsis and technic are now on a scientific footing. In view of this, our interpretation of the aberrent fluid changes in the following complicated cases is presented, and their interrelations with electrolyte and metabolic changes are discussed.

The graphs of these patients are also presented and identified by the patients' initials. As will be seen, an abruptly falling extracellular fluid volume is of ominous portent. This occurred in 3 of our patients. One of these died, and the other 2 had extremely stormy postoperative courses.

Ninth Day Postgastrectomy Syndrome.—Subject F. V., who had undergone partial gastrectomy, developed on his 7th postoperative day the typical so-called "ninth day syndrome," characterized by weakness, nausea and distention. This patient's positive fluid balance by the seventh day amounted to 3,135 ml. The extracellular fluid volume had increased from 12,200 to 16,400 ml. between the third and seventh postoperative days. This was a gain of 4,200 ml. or 6.3 per cent of his total body weight. The distention disappeared by the eleventh postoperative day, at which time the extracellular fluid volume returned to 12,550 ml., or 18.6 per cent of body weight.

Since there is a great deal of connective tissue and, incidentally, fat in the submucosa of the gastrointestinal tract, this patient certainly had submucosal edema on the seventh postoperative day. This is part of the expanded extracellular fluid space. His body weight decreased 3.2 Kg. by the seventh day, proving that there could not be intracellular edema as well. In fact he actually would have lost intracellular water to the extent of 1,065 ml. (4,200 minus 3,135) if fat oxidation had not produced "metabolic water." It is reasonable to average out his seven-day accumulation of "metabolic fat water" at about 150 ml. per day, making a total of 1,050 ml., since two equivalents of fat give approximately one equivalent of water.

Adrenal Insufficiency, Extracellular Fluid Decrease and Intracellular Edema.—Occasionally a functional or anatomic adrenal insufficiency develops after operation and, when it occurs, it is a most important factor in the case of the seriously ill postoperative patient. There is then no increased tubular sodium and water resorption and none of the customary postoperative humoral oliguria.[9a] There is excretion of large volumes of urine, and with it of sodium, in concentrations over 40 meq. per liter (normal postoperative secretion of sodium in the urine is less than 20 meq. per liter).[9d] This occurs in the face of low plasma sodium levels. One also must remember that a low [illegible] count may occur in the presence of [illegible] functioning adrenals as well as [illegible] these glands are well functioning.[10] [illegible] this condition there are, as will be shown, intracellular edema, and a decrease occurs in the extracellular fluid volume.

S. F. (Fig. 3), with far-advanced carcinoma of the gallbladder, who died on the seventh postoperative day, showed this

One can postulate that, in the presence of adrenal insufficiency, the usual corticoid-induced increase of cell permeability, with its outward shift of water and sodium, does not occur, and the resultant intracellular sodium shift will be less. There will be a decrease transfer of cellular potassium into the extracellular space and out in the urine. This patient was not given any sodium or potassium other than the 57 meq. of sodium and 20 meq. of potassium in her one blood transfusion. She would have a differential cellular potassium deficiency with lowered potassium reserve due to a long preoperative poor dietary intake and would be vulnerable to hypokalemia. In spite of her adrenal insufficiency some potassium would still be constantly lost in the urine.

In this patient the normal adrenal "secretant-induced" increase in extracellular fluid volume was reversed and cellular edema occurred, probably owing to adrenal insufficiency. The extracellular water became intracellular fluid, and "water intoxication" occurred. This patient, then, represents a case of extracellular water loss, intracellular edema and probable adrenal insufficiency, with a fatal outcome.

Hypokalemia and "Potassium Anoxia."—Patient A. T. (Fig. 4) who underwent cholecystectomy with exploration of the common duct, represents a case of hypokalemia with its usual "dehydration" or decrease in extracellular fluid volume, in her case amounting to a change of approximately 6 per cent of the total body weight (4,000 ml.).

She began to show marked lethargy, then diarrhea. She commenced vomiting by the fourth postoperative day, which was considered indicative of hypokalemia.[11] She was given 120 meq. of potassium in her infusion of dextrose, and even with the decreased extracellular fluid volume the plasma potassium level on the fifth postoperative day was only 3.1 meq. per liter.

By the fifth postoperative day the positive fluid balance was 2,850 ml. (This does not take into consideration the water formed by metabolism.) The extracellular fluid volume by this time had decreased by 4,400 ml. She had, therefore, a marked gain in intracellular fluid that constituted intracellular edema or "water intoxication."

Later the extracellular volume rose to above the preoperative levels. Clinically the patient had been dehydrated before the operation, and she was given 2,000 ml. of 5 per cent dextrose in water the day before operation and before the extracellular fluid volume was determined. Subsequent fluid studies bore out this impression by finally attaining the level of about 21 per cent of the total body weight.

Apparently water diuresis was present on the fourteenth postoperative day, with a loss of 3,300 ml. of extracellular water coincident with the "sodium diuresis" reported by others as taking place at this time.[9a] The plasma potassium level was 4.6 meq. per liter on the fourteenth postoperative day.

Subject E. W. (Fig. 5) was a woman 75 years of age who underwent an abdominoperineal resection with total hysterectomy and vulvoginectomy. Her clinical course and the decrease in extracellular fluid were very similar to those of A. T., without the vomiting. She was also a very seriously ill patient. By the third postoperative day there was a positive water balance of about 5.5 liters, according to balance studies. Her weight did not increase because of the fat and protein catabolism going on to maintain life. This catabolism results in the production of heat and the expiration of carbon dioxide. Since the extracellular fluid volume decreased by approximately 2.5 liters, there was an intracellular water shift with intracellular edema. By the third postoperative day the patient [illegible] meq of potassium chloride intravenously, after which the value for her plasma potassium was still only 3.6 meq. per liter.

This, then, was another instance of hypokalemia and intracellular water shift. In fact, the patient required 250 meq. of intravenous potassium chloride over the next three days to bring the plasma potassium up to normal. It is interesting to note that on the fourth postoperative day she voided 4,000 cc. of urine, and her fluid intake was 3,700 cc. Notwithstanding this, the extracellular fluid volume began to rise and finally became normal.

The remarkable speed of the clinical recovery of the patient in Case (A. T.) from a state in which her death appeared imminent after having received only 120 meq. of potassium chloride in 2,000 ml. of 5 per cent dextrose and water affords an excellent demonstration of the fact that with the main function of potassium is its essential role in oxygen transport. Other surgeons have also commented on the rapidity of clinical improvement in patients given potassium in the presence of hypokalemia.[12] Patient E. W. followed a similar pattern. The role of potassium in the maintenance of normal intracellular osmolarity and intracellular acid base balance is secondary, although important, and changes here exhibit slower clinical effects than those which come from "potassium anoxia."

With her potassium deficiency she is in effect suffering from cellular anoxia. Its improvement gives an immediate clinical response.

Potassium is involved in the red cell in oxygen transport as follows:[13]

While blood is in the tissues (as hemoglobin loses potassium it gives up its oxygen more easily)

KHb ....KHb + O_2

KHb + H_2CO_3..........$KHCO_3$ + HHb

While blood is in the lungs (reduced Hb being a weaker acid than oxy Hb and as Hb binds more K it increases its affinity for O_2)

$KHCO_3 + O_2 + HHb \ldots KHbO_2 + CO_2 + H_2O$

Also in the lungs

$KLC + HHb + O_2 \ldots\ldots KHbO_2 + HCL$

"CL shifts" out of the red cells into the plasma and

$HCL + NaHCO \ldots NaCL + CO_2 + H_2O$

It is thus apparent how essential potassium is in the mechanism of oxygen transport.

It is also obvious that carbon dioxide transport is intimately bound up with hemoglobin, potassium, chlorides and plasma protein. Carbon dioxide, after having been diffused into the red cells, combines with potassium in the cells. Carbon dioxide also combines with the plasma sodium, an equivalent amount of chloride shifting into the cells.[14] With deficient potassium, both these mechanisms are interfered with. There is a "potassium anoxia" and excess of carbon dioxide. It is possible that the anion to which the protein of carbonic anhydrase is bound is potassium, and hence the recent clinical benefit derived from "diamox" may also be partially dependent on its effect on potassium.

An examination of the classic oxygen association curve[12a] of hemoglobin shows that there is a shift to the right, with a decrease in electrolyte concentration. This means that there is an impairment of the dissociation of oxygen from its hemoglobin in the presence of a lowered electrolyte.

The importance of potassium in the oxygen transport mechanism has additional support in the recent report of Aronstam[15] that in thoracic surgery, in which one is dealing with pulmonary emphysema, fibrosis and arteriosclerosis, there is no negative potassium balance. It would appear that the usual postoperative augmented urinary loss of potassium is prevented by the body, in view of the increased danger of hypoxia in pulmonary disease.

The postoperative decrease in the plasma sodium level normally observed has recently been explained by workers in electrolyte studies as due to an intracellular shift of sodium. This change may become even more pronounced, of course, in patients with marked electrolyte losses, and curiously enough the administration of saline solution further lowers this decreased sodium level. The term "sodium paradox" has been coined to designate this apparent discrepancy.

Our studies show that there are two normal types of electrolytic response to surgical stress. First, in a clinically well patient, there may be no change in the extracellular fluid volume. Second, there may be a marked increase in extracellular fluid volume, commencing after operation. All this occurs irrespective of change in body weight and so occurs without a positive water balance.

There appears to be for each patient a "stress trigger point" below which there will be no change in the extracellular fluid volume and over which there occurs a marked increase in extracellular volume. The magnitude of the procedure and the adaptive mechanism of the patient govern the type of response. The important point is that it does not depend on sodium intake. This increase in extracellular fluid occurs when no intravenous saline solution is given and no sodium is taken by mouth, with no positive water balance and in the presence of a decrease in the plasma sodium level. In all our cases saline solution was given only to cover sodium losses by tube or bowel. No more than the absolute minimum was given. This means that most patients were given none.

What does take place is that potassium leaves the cells with this water and is lost in the urine if there is a negative potassium balance. Sodium also leaves the cells, owing to the change in cell permeability as a result of the aforementioned "secretants." The average postoperative patient, shifting about 4,000 milliliters of intracellular water, shifts approximately 300 milliequivalents of sodium along with it into the extracellular space; otherwise the plasma potassium level would be much lower than it is. A protein-bound electrolyte, probably calcium,[16] is liberated in the cells to maintain the ionic intracellular balance resulting from this shift.

This phenomenon of increase in extracellular fluid by shift of intracellular to extracellular water, together with a shift of sodium in the same direction, is a normal postoperative occurrence.

COMMENT

From a teleologic point of view one can see why man has come to show this adaptation to injury. The injured primitive animal lost blood and lay helpless under a tree. The only way he could get salt was to go to a salt lick, just as deer and moose do today. Supposing him to be a carnivorous animal, he would have to seek and kill his prey to replenish his own lost electrolytes and blood. He could do neither of these until he had recovered sufficiently. Nature thus conserved its salt and water by the increased liberation of desoxycorticosterone and other steroids.

With potassium the state of affairs was different. The animal oxidized fat for energy and constantly broke down body protein. Through increased corticoid production gluconeogenesis went ahead to provide him with energy from protein transformation. Some protein was used for reparative processes. This early catabolic protein phase released potass
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casi studiati dagli AA. tale fatto si accompagnò, o era dovuto, ad un aumento del liquido intracellulare, in relazione probabilmente con una ipofunzione surrenale. In tale condizione si assiste ad una vera caduta del volume del liquido extracellulare. La sindrome che, in nona giornata, segue talvolta la gastrectomia è dovuta ad un aumento di volume del liquido extracellulare. L'aumento di volume del liquido extracellulare, dopo traumi chirurgici, non dipende dalla somministrazione di sodio, tanto vero che esso si verifica anche quando non viene somministrato sodio o quando la quantità di questo vale soltanto a rimpiazzare la quota perduta. Esso aumento si accopagna ad una fuoriuscita di sodio negli spazi extracellulari.

RESUMEN

Se presenta el primer estudio grande acerca de los cambios de volumen líquido extracelular en una serie de sujetos quirúrgicos escogidos sucesivamente.

Se dan interpretaciones de respuestas normales y anormales al stress quirúrgico, a la luz de un concepto nuevo de cambios líquidos y electrolíticos. Se derivan las siguientes conclusiones:

En volumen líquido extracelular preoperatorio es un índice muy sensible del estado "acuosoelectrolítico" del paciente.

En aquellos pacientes en los que el trauma quirúrgico es suficiente para sobrepasar el "punto de gatillo" se produce normalmente un aumento del volumen líquido extracelular de 2000 a 8000 cc., o de 3 a 9 por ciento del peso corporal total. Bajo estas circunstancias, si esto no ocurre, existe ó ha existido preoperatoriamente deshidratación. Si la respuesta es mayor existe sobrehidratación.

Una caída postoperatoria en el volumen líquido extracelular es de pronóstico malo y en nuestros casos se acompañó o fué debida a un aumento del agua intracelular (intoxicación acuosa), probablemente debida a insuficiencia suprarrenal. En este estado ocurre una caída real en el volumen líquido extracelular. El síndrome postgastrectomía del noveno día es debido a un aumento del volumen líquido extracelular.

El aumento del volumen líquido extracelular inducido por el "stress" no depende de la administración de sodio. Ocurre cuando no se da sodio o cuando existe únicamente un reemplazamiento de la pérdida sódica, qué se acompaña de un cambio de sodio hacia el espacio líquido extracelular.

RÉSUMÉ

Les auteurs présentent la première étude importante sur les modifications du volume du liquide extracellulaire dans une série de cas chirurgicaux.

Ils donnent une intreprétation des réactions normales et anormales, à la lumière des nouvelles conceptions de l'électrolyte et des modifications du liquide extracellulaire, et en tirent les conclusions suivantes.

Le volume pré-opératoire du liquide extracellulaire est un indicateur très précis du status "eau-électrolyte" du malade.

Chez les patients où le choc opératoire suffit à dépasser le "stress trigger point," il se produit normalement une augmentation du volume du liquide extracellulaire allant de 2000 à 3000 ml, ou de 3 à 9% du poids total du corps. Dans le cas contraire il y a, ou il y a eu une déshydratation pré-opératoire. Lorsque ces chiffres sont dépassés il y a sur-hydratation.

La chute post-opératoire du volume du liquide extracellulaire est de mauvais augure, et dans les cas des auteurs elle était accompagnée d'une augmentation de la quantité du liquide intracellulaire (ou causée par elle), et probablement par une carence d'adrénaline. Le syr [illegible]

gastrectomique du 9ème jour est dû à une augmentation du volume du liquide extracellulaire.

Une augmentation importante du volume du liquide extracellulaire ne dépend pas de l'administration de sodium, elle se produit aussi lorsqu'on ne donne pas de sodium ou lorsqu'il y a simplement un remplacement de la perte en sodium. Elle est accompagnée d'un déplacement de sodium dans le liquide extracellulaire.

ZUSAMMENFASSUNG

Es liegt die erste umfangreiche Untersuchung der Veränderungen im extrazellulären Flüssigkeitsgehalt auf Grund einer umfassenden Serie aufeinanderfolgender chirurgischer Fälle vor.

Die Deutung der normalen und pathologischen Reaktionen auf chirurgische Belastung erfolgt im Lichte einer neuen Auffassung vom Elektrolyten- und Wasseraustausch. Es werden die folgenden Schlussfolgerungen gezogen:

Die präoperative extrazelluläre Flüssigkeitsmenge ist ein sehr empfindlicher Index des "Wasser- Elektrolyten"-Zustandes des Kranken.

Kranke, bei denen das operative Trauma des chirurgischen Eingriffs stark genug ist, die "stress"-Auslösungsschwelle zu überschreiten, weisen gewöhnlich einen Anstieg der extrazellulären Flüssigkeitsmenge von 2000 auf 8000 ccm oder von 3 auf 9% des gesamten Körpergewichts auf. Bleibt dieser Anstieg unter den gleichen Bedingungen aus, hat eine präoperative Wasserverarmung vorgelegen. Ist der Anstieg grösser als zu erwarten war, so handelt es sich um eine Wasseranreicherung.

Ein postoperatives Sinken des extrazellulären Flüssigkeitsgehalts ist ein unheilvolles Zeichen und war in den Fällen der Verfasser begleitet von oder zurückzuführen auf einen Anstieg des intrazellulären Wassergehalts ("Wasservergiftung"); wahrscheinlich beruht es auf einen Versagen der Nebenniere. In diesem Zustand kommt es zu einem echten Absinken der extrazellulären Flüssigkeitsmenge. Der am neunten Tage nach einer Magenresektion auftretende Symptomenkomplex beruht auf einem Anstieg der extrazellulären Flüssigkeitsmenge.

Der "stress"-bedingte Anstieg der extrazellulären Flüssigkeitsmenge ist von der Natriumzufuhr unabhängig. Er tritt ein, wenn kein Natrium zugeführt wird, oder wenn lediglich der Natriumverlust ersetzt wird. Der Anstieg geht mit einer Verschiebung des Natriums in die extrazellulären Flüssigkeitsräume einher.

SUMARIO

É apresentado o primeiro amplo estudo das alterações do volume líquido extracelular numa série de pacientes cirúrgicos consecutivos e escolhidos.

É dada a interpretação das respostas normal e anormal ao ato cirúrgico, sob a luz de um novo conceito sôbre as mudanças eletroliticas e líquidas. As seguintes conclusões são apresentadas:

O volume líquido extracelular pré-operatório é um índice muito sensivel do estado "eletrolitico-aquoso" do paciente.

Nos pacientes em que o trauma operatório é suficiente para ultrapassar o ponto crítico, ocorre normalmente um aumento do volume líquido extracelular de 2000 a 8000 ml., ou de 3 a 9 porcento do pêso total do côrpo. Nessas circunstancias, se tal não acontecer, há ou houve desidratação pré-operatória. Caso seja maior do que o esperado, há superhidratação.

Uma queda pós-operatória no volume líquido extracelular e de más consequênciasem quatro de nossos casos foi acompanhada por um aumento na água intracelular ou (intoxicação por água) ou devida à mesma, sendo provavelmente devi-

da a uma insuficiênica supra-renal. Neste estado ocorre uma queda pós-operatória verdadeira no volume líquido extracelular. O sindrome pós-operatório do 9° dia é devido a um aumento do volume líquido extracelular.

O aumento do volume líquido extracelular provocado pelo trauma não depende da administração do sódio. Ocorre quando não é administrado sódio ou quando há meramente a reposição do sódio perdido, sendo acompanhado pela mudança do sódio para o espaço líquido extracelular.

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> The sense for style . . . is an aesthetic sense, based on admiration for the direct attainment of a foreseen end, simply and without waste. Style in art, style in literature, style in science, style in logic, style in practical execution have fundamentally the same aesthetic qualities, namely attainment and restraint. The love of a subject in itself and for itself, where it is not the sleepy pleasure of pacing a mental quarter-deck, is the love of style as manifested in that study. Here we are brought back to the position from which we started, the utility of education. Style, in its finest sense, is the last acquirement of the educated mind; it is also the most useful. It pervades the whole being. The administrator with a sense for style hates waste; the engineer with a sense for style economizes his material; the artisan with a sense for style prefers good work. Style is the ultimate morality of the mind.
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> —*Whitehead*

An Experimental Study of the "Elusive" Bladder Ulcer of Hunner

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HUNNER's ulcer of the bladder is one of the most unusual, least understood, most disturbing, most painful and most unsatisfactorily treated conditions with which the urologist has to deal. It is also known as "interstitial cystitis." Although it may rarely occur in men, for all practical purposes it can be said to be a condition peculiar to women. Although in my experience it has never occurred on an infectious basis and has never been known to become malignant, it can cause more mental anguish, pain and associated neurosis in women than does cancer of the bladder. In fact, women have been known to become narcotic addicts or to commit suicide to put an end to the constant, painful urination that goes on day and night. It is because of this unsatisfactory clinical course that I was prompted to a further study of the cause of this bizarre condition. It is also known as "elusive" ulcer of the bladder, because it can be diagnosed only by a cystoscopic examination with the patient under general anesthesia, in which distention of the bladder produces linear bleeding fissures in the mucosa. These are characteristic and diagnostic of this condition. The capacity of the bladder often is only 1 or 2 ounces. The bladder itself is thickened and spastic, and urination is painful because any tendency of the bladder to become even partially filled and stretched causes reopening of the small linear ulcers, with a resulting knifelike pain. These ulcers heal as white, raised, contracted linear scars, also characteristic and diagnostic of the chronic condition. Unfortunately, this type of ulcer has, as yet, no cure. The best that the urologist can do is to give temporary relief by periodic dilations of the bladder with the patient under anesthesia, fulguration of the linear fissures and incision of the contracting scars. Also, mild instillations of silver into the bladder have given some relief. Recently, sensational relief has been reported after the use of cortisone, which often lessens the frequency of treatments from one every two weeks to once every six months.

With regard to surgical treatment, presacral neurectomy as a cure has fallen by the wayside. Because of the state of confusion that still exists about the status and results of all methods of diversion of urine proposed so far, complete cystectomy as a solution of the problem is to be avoided. Instead of cystectomy, some such operation as the use of an isolated ilial segment for an artificial diverticulum of the small contracted bladder may be a solution. Since the pain associated with this condition is due to the filling of a small, spastic bladder, such an added diverticulum would absorb the flow of a full bladder without dilating the ulcerated part.

The cause has been obscure since the ulcer was first described by Guy Hunner in 1914. Its infrequent occurrence in the male suggests some peculiar predisposition in the female, possibly on an anatomic or hormonal basis. Through such factors

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Sept. 28, 1954.

as previous pelvic inflammation, pelvic operations, pregnancies or pelvic injuries are not recognized as causative, a number of my patients mentioned vesical symptoms definitely occurring three or four months after pelvic operations. It is generally accepted that paracystitis is the primary cause and the ulcer a secondary manifestation. I have suggested for some time that the following sequence of events may be correct: Paracystitis, followed by adhesions and fibrosis, leads to contraction of the bladder, with areas of evascularity, atrophic mucosa and finally ulceration in the least vascular portion of the bladder, namely, the apex. Clinically, therefore, the picture is that of a small, contracted, spastic, painful bladder relieved by dilation with the patient under anesthesia and characterized by the formation of bleeding linear ulcers when distended.

The microscopic picture described by Hunner is still representative of the consensus and is as follows: 1. Chronic inflammation of all coats of the bladder is present but is being localized to the ulcer-bearing area. The bladder wall is thickened by edema. 2. Granulation tissue is observable in the underlying mucosa at the site of the ulcer. 3. The mucosa shows a preponderance of connective tissue cells, masses of small round cells and leukocytes. 4. The capillaries in the mucosa are abundant and filled with leukocytes. 5. The muscularis is hypertrophied and shows dilated lymph spaces filled with small round cells. 6. The peritoneum subtending the diseased area shows decided thickening. (I was able to reproduce almost every one, as will be described in connection with the histologic sections of dog bladders.)

The experimental work was confined to investigation of the rôle that severe but localized paracystitis with areas of ischemia might play in reproducing the clinical and histologic picture of Hunner's ulcer. Fifteen dogs were used, and 120 microscopic sections were submitted to the pathologist for examination. Human and dog anatomy compare favorably with regard to the relations of the bladder, vagina, cervix and uterus. The surgical procedures used to produce localized paracystitis were as follows:

1. Suturing of the vagina and uterine horns to the posterior wall and vertex of the bladder.

2. Promotion of formation of adhesions between the bladder, vagina and uterus by scraping the external walls of these organs with a scalpel.

3. Introduction of an infected bone spicule into a cul de sac formed by suturing the posterior bladder wall to the uterine horns, using the fat of the uterine horns to close in the pocket at the sides and vertex. These bond spicules were infected with Streptococcus viridans taken from a dental abscess.

4. Simple ligation of vessels of the posterior wall and vertex of the bladder from the external or the peritoneal aspect.

The reasons for these procedures were as follows:

1. It is known that this condition is encountered largely in women. This, among other things, led to a consideration of the anatomic relations of the female genital organs, especially those adjacent to the bladder. These are from the vertex down to the trigone, respectively, the fundus uteri, the cervix uteri and the vagina, the vagina being attached to the posterior wall of the bladder by dense fibrous tissue and the cervix by loose connective tissue, and the fundus uteri resting on the vertex of the bladder and separated from it by two layers of peritoneum.

2. Almost all these lesions appear on the posterior wall of the vertex of the bladder.

3. The pathologic picture of an elusive ulcer is one that involves "all the coats of the bladder, often extending to the peritoneum."

4. A number of patients with ulcer have stated that the bladder symptoms definitely occurred three or four months after pelvic operations.

5. The urine is sparkling clear; it is normal on cell count and culture and remains so even after repeated cracking and opening of the ulcer. This fact leads one to the conviction that a focus of infection may not necessarily be a part of the picture. The aforementioned evidence strengthens my contention that localized small cicatricial areas on the posterior bladder wall, whether produced by surgical adhesions, pelvic inflammation, vessel ligation or hematogenous infection, may develop into lesions similar to the ulcer of Hunner. This experiment, therefore, will concern itself with the simple production of cicatricial areas on the posterior bladder wall as aforedescribed, and the observation and interpretation of the cystoscopic and histologic pictures.

Summary and Comparisons of Cystoscopic Observations in Experimental Dogs.—Cystoscopically the bladders presented similar pictures, whether adhesions were produced by infection or trauma, or whether vessels were ligated or not. The mucosa in the involved area in most cases was pale, with a faint demarcation of the vessel before overdistention of the bladder. On overdistention of the bladder the mucosa would assume a deeper reddish tint and many petechial hematomas would appear. Occasionally these would become minute hemorrhagic spots. Often, after prolonged distention, the mucosa of the posterior bladder wall would split, in striae 1 to 2 cm. long.

The urine was usually very clear before distention and tinged with pink or red after distention, a phenomenon characteristic of this disease in the adult female. The bladder capacity of almost all dogs was decreased. The petechial hemorrhages were usually more marked in those dogs which had been observed for a longer time and were slightly more numerous in those bladders in which some of the vessels of the vertex had been ligated.

A few of the dogs showed pain by groaning when their bladders were overdistended, even when they were under deep anesthesia (intravenous nembutal, with an effect identical with that produced in human beings). Normal dogs, however, when subjected to overdistention of the bladder with the same hydrostatic pressure and the same degree of anesthesia, gave no evidence of pain. There was also no indication of splitting or hemorrhage in the mucosa or of discoloration of distending fluid in these normal dogs.

Summary and Comparison of Gross Pathology in Experimental Dogs.—Dense adhesions formed between the posterior bladder wall, uterus and vagina in almost all of the dogs. Especially was this true of dogs into which infection was introduced against the posterior bladder wall. A more typical cystoscopic and histologic lesion was produced, however, in dogs whose bladder vessels were ligated, even in the absence of dense adhesions.

Summary and Comparison of Histopathology in Experimental Dogs.—Most of the time sections were taken twelve weeks after the operation. Many of the microscopic sections show a picture of chronic inflammatory change. There is hyperplasia of lymphatic tissue, manifested either as a scattered infiltration of round cells or in the form of small lymphoid follicles in the mucosa and lamina propria.

Many slides show small hemorrhages in the mucosa beneath the epithelium, and occasionally in the lamina propria. This type of hemorrhage [illegible] in dogs [illegible] were subjected to [illegible] with overdistention immediately before the bladders were removed. Hemorrhage into the tissues did not occur, however, in dogs without some adhesions between the bladder and the adnexae. Several slides showed that the increased thickness of the lamina propria or submucosa was slightly more marked in those bladders in which the vessels had been ligated. These bladders also had a greater infiltration of round cells, plasma cells, and polymorphonuclear leukocytes. There were several areas of edema and scattered fibroblasts beneath the areas of vessel ligation.

An interesting observation was that the histologic involvement of the bladders whose posterior walls were infected, with no ligation of vessels, was practically all confined to the outer coats of the bladder adjacent to the infection, very slight changes being observed in the mucosa and lamina propria.

SUMMARY

1. An experimental study was carried out in an attempt to determine the cause of elusive ulcer. Dogs were used as experimental animals.

2. Experimental lesions were produced in the bladders of dogs. These lesions resembled elusive ulcers both cystoscopically and histologically.

3. The most typical pathologic picture of Hunner's ulcer was reproduced in bladders in which there were multiple areas of localized ischemia of the posterior wall, and the second best where dense adhesions and fibrosis of the vesical wall had formed between the bladder and the uterus.

RÉSUMÉ

1. Etude expérimentale sur des chiens, en vue de déterminer l'origine du pseudo-ulcère de Hunner.

2. Lésions expérimentales sur des vessies de chiens. Ces lésions ressemblaient à des pseudo-ulcères, aussi bien cystoscopiquement qu'histologiquement.

3. Image pathologique de l'ulcère de Hunner. La plus typique a été reproduite sur des vessies dans lesquelles il y avait de multiples zones d'ischémie localisée à la paroi postérieure. Le second terrain le plus favorable est celui ou s'étaient formées des adhérences denses et de la fibrose de la paroi vésicale entre la vessie et l'utérus.

SUMARIO

1. Foi levado a efeito um estudo experimental, com o objetivo de determinar-se a causa de úlcera "elusive." Foram usados cachorros nessas experiências.

2. Foram, produzidas lesões experimêntais nas bexigas de cachorros, lesões essas que se assemelharam às úlceras "elusive" tanto cistoscopica como histologicamente.

3. O quadro patológico mais tipico da úlcera de Hunner foi reproduzido em bexigas, nas quais havia multiplas áreas localizadas de isquemia da parede posterior e, no segundo quadro de maior valor, havia formação de densas aderências e fibrose da parede vesical, entre a bexiga e o útero.

ZUSAMMENFASSUNG

1. Es wurden experimentelle Untersuchungen an Hunden ausgeführt mit dem Ziel, die Ursache des flüchtigen Blasengeschwürs ("elusive" ulcer of Hunner) zu bestimmen.

2. Die in der Blase von Hunden experimentell hervorgerufenen Schädigungen ähnelten sowohl zystoskopisch als auch histologisch den Hunnerschen Geschwüren.

3. Das typischste pathologische Bild des Hunnerschen Geschwürs wurde in Blasen erzeugt, die mehrere Gebiete örtlicher Blutarmut der hinteren Blasenwarn aufwiesen; die zweitbesten Resultate fanden

sich in Fällen, wo dichte Verwachsungen und eine Fibrose der Blasenwand zwischen Blase und Gebärmutter entstanden waren.

RIASSUNTO

1. Vennero condotte ricerche sperimentali su cani allo scopo di determinare la causa dell'ulcera di Hunner.

2. Vennero sperimentalmente prodotte lesioni in vesciche di cani. L'aspetto istologico e cistoscopico di tali lesioni fu simile a quello delle ulcere di Hunner.

3. I quadri più tipici di ulcera di Hunner furono riprodotti in vesciche in cui v'erano numerose zone ischemiche della parete posteriore e dove si erano formate fibrosi della parete vescicale e spesse aderenze fra la vescica e l'utero.

RESUMEN

1. Se realizó un estudio experimental con el fin de determinar la causa de la úlcera de Hunner. Se usaron perros como animales de experimentación.

2. Se produjeron lesiones experimentales en las vejigas de los perros. Dichas lesiones mostraron parecido cistoscópico e histológico con la úlcera de Hunner.

3. Las imágenes patológicas más típicas de úlceras de Hunner se produjeron en vejigas con áreas múltiples de isquemia localizada de la pared posterior y en las que presentaron adherencias y fibrosis intensas entre la pared vesical y el útero.

Authors Note: This work was originally begun in collaboration with the late Dr. R. H. Herbst and K. L [illegible], and has subsequently been added to.

The magnificent demand of youth for odds—long odds, whatever the cost!—has a pathetic side to it, once one is in a position to look back, thereon squinting gloomily through the wrong end of the telescope. At the age of six or seven, the boy (in the person of his hero of the hour) can take on a Genie, an Afreet or two, a few Sultans and a couple of hostile armies, with a calmness resembling indifference. At twelve he is already less exacting. Three hundred naked Redskins, mounted on mustangs and yelling like devils, pursue him across the prairie and completely satisfy his more modest wants. At fifteen, 'tis enough if he may only lay his frigate alongside of two French ships of the line; and among the swords he shall subsequently receive on his quarter-deck he will not look for more than one Admiral's; while a year or two later it suffices if he can but win fame and fortune at twenty-five, and marry the Earl's daughter in the face of a whole competitive House of Lords. Henceforward all is declension. One really has not the heart to follow him, step by dreary step, to the time when he realises that a hero may think himself lucky if he can only hold his own, and so on to the point when it dawns on him at last that the gods have a nasty habit of turning the trump, and have even been accused of playing with loaded dice—an aphorism any honest boy would laugh to scorn.

Recurrent Perforation of Peptic Ulcer*

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THE incidence of recurrent perforation of peptic ulcer is not appreciated, even though it is now well established that the patient who has had one perforation is likely to suffer from other complications, such as hemorrhage, obstruction and intractibility, before the life history of his ulcer has run its course.

Pearse[1] in 1932 reported 1 case of recurrent perforation of peptic ulcer and in a review of 4,813 cases of perforated peptic ulcer found 33 cases of recurrent perforation, an incidence of 0.69 per cent. DeBakey[2] in 1940 found recurrent perforation in 74 of 6,538 cases of perforated peptic ulcer, an incidence of 1.1 per cent. Milroy[3] published a case of recurrent perforation of duodenal ulcer in 1940 and cited cases by Moynihan,[4] Turner,[5] Butler,[6] Wheeler[7] and Lysaght and Williams,[8] in British literature. Fobes[9] in 1941 reported 3 cases of recurrent perforation of peptic ulcer and cited 70 cases in the French literature, 4 in the Canadian and 4 more in the American. In 1941 Cohn[10] published 12 cases of recurrent perforation of peptic ulcer at the San Francisco Hospital. Royster[11] in 1942 reported the recurrent perforation of a gastric ulcer that perforated five times. Olin[12] described the third perforation of a gastrojejunal ulcer in 1946, at which time he did a subtotal gastrectomy. Gibertini[13] in 1948 described 2 cases of recurrent perforation of the duodenum and Bernard[14] cited M. Lanthier's case of emergency subtotal gastrectomy for recurrent perforated duodenal ulcer, in the same year. DiBello[15] reported 3 more cases of recurrent perforation of the duodenum in 1951.

Cohn[10] in 1941 reported 12 cases of recurrent perforation in 300 cases of perforated peptic ulcer, an incidence of 4 per cent. Estes and Bennett[16] reported 8 cases of recurrent perforation in 63 cases followed, an incidence of 12.7 per cent, in 1944. Baritell[17] reported recurrence of perforation in 6 of 88 patients, a recurrence rate of 6.8 per cent, in 1947, as did Werbel, Kozoll and Meyer[18] (1947) of 42 of 239 patients, an incidence of 17 per cent. Kingsbury and Schilling[19] reported 25 repeated perforations in 224 cases of perforated peptic ulcer in 1947, an incidence of 12 per cent. S. W. Moore[20] in 1950, in a series of 101 patients at Bellevue Hospital and 157 patients at the New York Hospital reported that 5, or 5 per cent, of the Bellevue patients had reperforations, and that 9 or 5.8 per cent of the New York Hospital patients fared similarly. Turner,[21] in 1951, reported recurrent perforation in 9, or 6.3 per cent, of 143 cases of perforated peptic ulcer subject to follow-up studies at the Presbyterian Hospital in New York City. In 48 cases of perforated peptic ulcer in which operation was done by the Second Surgical Division at Fordham Hospital between 1948 and 1953, 2 recurrent perforations occurred, an incidence of 4.1 per cent. This would make a total of 1,363 cases of perforated peptic ulcer with 118 recurrent perforations, a recurrence rate of 11.5 per cent (Table 1).

Jones[22] estimated that between 0.5 per cent and 1 per cent of all ulcers in male patients will perforate for the first time. Colp and Druckerman[23] expressed the

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From the Second Surgical Division, Fordham Hospital.

*The cases described in this paper have been presented with the kind permission of Dr. A. B. Sullivan, Director, Second Surgical Division, Fordham Hospital.

Submitted for publication Nov. 17, 1954.

TABLE 1.—*Cases of Recurrent Peforation of Peptic Ulcer*

Source	*No. of Cases of Perforated Peptic Ulcer*	*No. of Cases of Recurrent Perforations*	*% of Recurrent Perforations*
Cohn	300	12	4.0
Estes & Bennett	63	8	12.7
Baritell	88	6	6.8
Werbel, Kozoll & Meyer	239	42	17.0
Kingsbury & Schilling	224	25	12.0
Moore			
Bellevue Hospital series	101	5	5.0
New York Hospital series	157	9	5.8
Turner	143	9	6.3
Fordham Hospital	48	2	4.1
	1363	118	11.5

TABLE 2.—*Reperforation of Peptic Ulcer in Pearse's Series*

			Recurrent Perforations	
Operation	*No. of Cases*	*%*	*No.*	*%*
Simple suture	710	67	24	72.0
Suture and gastro-enterostomy	281	26.6	8	24.3
All others	65	6.2	1	3.0

opinion that acute perforation is a fairly common complication of peptic ulcer and is seen for the first time in not more than 2 per cent of patients with peptic ulcer. Comparing these figures with those in Table 1 would appear to indicate that recurrent perforation of peptic ulcer is not uncommon. This comparison would also suggest that once a peptic ulcer has perforated, the likelihood of its doing so again would be greater than if it had not done so.

The accident of repeated perforation of the same ulcer must be distinguished from that of perforation of another ulcer in the same patient. It is frequently difficult to determine whether the perforation is a reperforation at the same site as the previous one or a recurrent perforation at another site. This may be determined with some degree of certainty by the presence of nonabsorbable suture material at the same site. It would appear from a review of the cases reported that the majority of recurrent perforations were in a different site from that of the original perforation. Cohn[10] reported recurrent perforation at the same site in 3 of 12 cases reported. Estes and Bennett[16] reported that the site of the ulcer was the same as in the initial perforation in 3 cases, 1 of the ulcers being duodenal and 2 gastric, out of 8 recurrent perforations. In the 2 cases observed at Fordham Hospital and included in this report, 1 perforation occurred at exactly the same site, as determined by the presence of nonabsorbable suture material.

It is difficult to estimate the incidence of recurrent perforation following various surgical procedures. Pearse[1] stated that the rate of recurrent perforation after various surgical procedures approximates the respective incidence of their use (Table 2). It can be said that recurrent perforation has followed each type of operative procedure used for repair. Most of the reports are those following simple repair, since this is the most popular method of treatment. Perforation has followed simple closure combined with gastroenterostomy and has occurred when subtotal gastrectomy was the method of repair.

Recurrent perforation has been reported as occurring as many as five times in 1 patient. In Werbel's[18] series of 42 cases, 35 perforations occurred twice; 5 ulcers perforated 3 times, 1 four times and 1 five times. The longest interval between perforations in Werbel's series was twenty-eight years and the shortest six months. Henry[24] reported five perforations in 1 patient over a five-year period. The first occurred on the anterior wall of the stomach, on which subtotal gastrectomy had been performed. Subsequently three perforations of a jejunal ulcer occurred within the next four years, [illegible] lowed by reperforation of the [illegible] ulcer.

The treatment [illegible]

Operation on the day of admission showed a large amount of brownish white material, which appeared to be barium, in the peritoneal cavity. The lower end of the stomach was easily visualized, and an indurated area about the size of a silver quarter was seen in the prepyloric region, with a pinhead opening in it from which gastric contents could be expressed. The ulcer was closed, and the patient was discharged on February 27, after an uneventful recovery.

Second Admission.—The patient was readmitted on May 30, with a three-day history of high abdominal pain and vomiting. He was in acute distress and apprehensive. His skin was pale and dry. The temperature was 102 F., the pulse rate 110, the blood pressure 126 systolic and 70 diastolic. The abdomen was rigid and tender throughout, and examination was difficult, as the patient was doubled up and could straighten out only with difficulty. Liver dullness was obliterated. There was rebound tenderness throughout the abdomen. Roentgen study showed free air under the right dome of the diaphragm.

Operation was performed on May 30. A large amount of free "coffee ground" serous material was observed in the peritoneal cavity. The stomach presented a roughly triangular perforation about ½ inch (1.2 cm.) in diameter in the prepyloric region, on the anterior aspect, near the greater curvature, with the aforementioned fluid escaping through it. The edges of the perforation were about ⅜ inch (0.5 cm.) in thickness, with a surrounding zone of induration about 2 inches (5 cm.) in diameter. A small section of the edge of the ulcer was excised and sent for pathologic examination. At the lateral edge of the perforation there was a portion of adherent omentum, with a piece of old suture material from the previously repaired rupture. The suture material was removed, and the perforation was closed with a continuous linen Lembert suture and reinforced with a layer of six interrupted mattress sutures. A portion of adjacent omentum was anchored over this line of repair. The pathologist reported diagnosis compatible with chronic peptic ulcer. The patient's convalescence was uncomplicated. A gastrointestinal roentgen series on June 13 was reported as showing the stomach to be normal; the duodenal cap was grossly deformed, only a small remnant being left. This deformity was due to old ulcer and postoperative scar. There was a six-hour, small gastric residue.

Subtotal gastrectomy was performed on June 19 without difficulty. The patient was discharged to the outpatient department. Three years later he had no complaints and no pain and felt well.

COMMENT

Turner[21] has pointed out that the management of the patient with perforated ulcer has passed through two stages and is now entering the third. He notes:

1. The tendency in former years was to treat the patient with perforated ulcer medically through the follow-up period. To a certain extent this treatment was casual, and perhaps even negligent in some cases, because of the widespread belief that perforated peptic ulcers are different, and that many will be cured once they have perforated.

2. In more recent years, with the growth of the concept of the ulcer diathesis, it has become increasingly obvious that the patient with perforated ulcer should at least be treated like the patient with any other peptic ulcer: that is, he should receive expectant follow-up therapy, and complications should be treated as they arise.

3. It is now the belief of some surgeons that the patient with an ulcer that perforates has thereby shown evidence that the disease is intractible and should be subjected to prophylactic elective gastrectomy within three to four weeks after recovery from the acute episode.

This paper would seem to indicate that once a patient with peptic ulcer has had a perforation the likelihood of its recurrence is greater than it would be in a patient in whom the ulcer has not perforated; therefore, the indication for prophylactic elective gastrectomy after recovery from the acute episode of perforation is still clearer.

CONCLUSIONS

1. Recurrent perforation of peptic ulcer is not uncommon. Once a peptic ulcer has

been perforated, the likelihood of recurrence is greater than before.

2. Recurrent perforation of peptic ulcer usually occurs at the site of a different ulcer rather than that of the previously perforated one, though reperforation may occur at the same site.

3. Recurrent perforation has followed each type of surgical procedure used in treatment of perforated peptic ulcer.

4. Simple closure with or without an omental graft is the simplest, safest and most popular method of repair.

5. Recurrent perforation of peptic ulcer is a sign of intractability of the ulcer, and is a definite indication for prophylactic elective gastrectomy following recovery from the acute episode.

SUMMARY

Two cases of perforated peptic ulcer have been described. Perforation recurred within five months in each case. Subtotal gastrectomy was performed on each patient as an elective prophylactic operation within six weeks of recovery from the last perforation. The incidence and treatment of recurrent perforation of peptic ulcer are discussed.

SUMARIO

São descritos dois casos de úlcera péptica perfurada. Nos dois casos a perfuração recidivou dentro de 5 meses. Foi feita gastectomia sub-total em ambos os pacientes no prazo de 6 semanas após o restabelecimento da última perfuração, como operação profilática de escolha. São discutidos a incidência e o tratamento da perfuração recidivada das úlceras pépticas.

ZUSAMMENFASSUNG

Es wird ueber zwei Faelle von perforiertem peptischem Geschwuer berichtet. In beiden Faellen wiederholte sich die Perforation innerhalb von fuenf Monaten. Beide Kranke wurden sechs Wochen nach Heilung der letzten Perforation einer prophylaktischen subtotalen Magenresektion unterzogen. Die Haeufigkeit und die Behandlung wiederholter Perforationen peptischer Geschwuere werden eroertert.

RESUMEN

Se describen dos casos de úlcera péptica perforada que recidivaron alos cinco meses. En ambos pacientes se hizo gastrectomía subtotal como operación profiláctica electiva dentro de las seis semanas de convalescencia de la última perforación. Se discuten la incidencia y tratamiento de la perforación recidivante de la úlcera péptica.

RIASSUNTO

Vengono presentati 2 casi di ulcera perforata, in cui la perforazione si ripetè entro 5 mesi. Dopo la seconda perforazione furono trattati con resezione subtotale a scopo profilattico. Viene discussa la frequenza delle perforazioni iterative e la loro cura.

RÉSUMÉ

Deux cas de perforation d'ulcère peptique sont décrits, avec récidive après cinq mois dans chaque cas. Une gastrectomie subtotale a été pratique chez ces deux malades, comme traitement prophylactique de choix dans un délai de six semaines après la guérison de la dernière perforation. La fréquence et le traitement de la perforation récidivante de l'ulcère peptique sont discutées.

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—*Whitehead*

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—*Whitehead*

Clinical Experiences with Retropubic Prostatectomy

DAVID PRESMAN, M.D., F.I.C.S.
CHICAGO, ILLINOIS

THE description of the retropubic approach for removal of the hypertrophied prostate by Millen in 1945 was followed by a wave of enthusiasm in many medical centers throughout the world. Published reports of relatively small series of operative cases appeared, with the results pictured in glowing terms. Mortality rates and complications were said to be virtually nonexistent, and the operation was hailed by some as the final answer to the urologist's dream. In rebuttal, others have claimed that the procedure is followed by an alarmingly high incidence of complications and should be discarded as valueless. This opinion, in too many instances, rested upon meager experience, insufficient to confer proficiency in performing the operation. Indeed, some of the more outspoken critics have admitted that their criticisms were largely based upon theoretical grounds and hearsay evidence. These two extreme points of view often appear after any new surgical procedure is suggested and usually result in confusing the issue and preventing any rational appraisal of the operation. There is no perfect operation. Advances in surgery consist primarily of improvements in technic that reduce complications and improve operative results. The operation without any complications and with 100 per cent of cures is yet to be devised.

Sufficient time has now elapsed and adequate experience has been accumulated to enable one to assess the advantages and disadvantages of retropubic prostatectomy. My general conclusion, based upon a relatively large number of cases, is that it is a sound procedure of undeniable merit but is hardly the perfect operation that some of its more enthusiastic proponents claim. I am of the opinion that in the main it is a superior procedure to the other forms of open enucleation of the prostate. There are instances, however, in which the suprapubic transvesical or perineal approach is preferable. The modern urologist, therefore, should be capable of performing any of these operations when indicated.

The complications and morbidity factors associated with retropubic prostatectomy have not been eliminated, but the overall picture is generally favorable, with several problems remaining to be solved. The various factors upon which this evaluation is based will be considered in detail under the general headings of operative technic and postoperative complications.

Operative Technic.—I have published a description of my operative technic. With a few minor changes I have found it satisfactory. Several basic points should be emphasized. The use of the kidney rest to elevate the pelvis is of inestimable value in improving exposure of the prostate. The patient is placed on the table so that the upper border of the symphysis is at the same level as the upper border of the kidney rest. By elevation of the kidney

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Oct. 21, 1954.

rest to its maximum height the space of Retzius is opened widely, the prostate is raised and the entire operative site becomes more accessible. This maneuver is especially important for the obese patient with a deep pelvis and a low-lying prostate.

According to my experience, as few instruments as possible should be used throughout the operation. Since the operative field is limited by a bony cage, every instrument in the field serves to impede exposure and render the procedure more difficult. The various special retractors and instruments of many types that have been described are unnecessary and make the operation needlessly complex. A self-retaining abdominal retractor of the Balfour type or a pair of the standard right-angled hand retractors used for abdominal procedures will provide sufficient exposure. The bladder is best retracted away from the prostate by the use of one or two stick sponges. These are held by an assistant, and by gentle pressure upward and backward the entire anterior aspect of the prostate is exposed, allowing ample room for the operation to be performed under direct vision.

I have previously reported the advantages of the transverse abdominal incision over the vertical midline incision. This has been especially helpful in patients with obese abdomens. Since a larger experience with this incision has accumulated, however, there have been several instances of postoperative inguinal hernia developing a few months after the operation. Because of this complication I have reverted to the vertical incision for the most part, reserving the use of the transverse incision for the patients with a very obese abdomen.

The commonest criticism of retropubic prostatectomy has been directed toward the marked bleeding encountered from the anterolateral prostatic plexus of veins prior to enucleation of the prostate. Many urologists have condemned the operation because of unhappy experiences with profuse hemorrhage from this plexus of veins. This complication can be easily avoided if all manipulations are performed with care and gentleness. Rough handling of tissues and instruments will invariably result in the tearing of these vessels, with troublesome bleeding. The source of this bleeding is usually the extensive venous network present on the anterolateral aspect of the prostatic capsule, as has been so vividly demonstrated on cadaver preparations by Beneventi. Any sponging or retraction in the lateral fossae on either side of the prostate should therefore be carefully avoided, since these veins are very friable and will bleed profusely if traumatized. If bleeding does occur in this area, attempts at clamping and ligating the veins will only aggravate the situation, because of the friable nature of the vessels. Hemostasis is best obtained by gently packing the fossa with gauze and proceeding with the operation.

Another source of bleeding, although less troublesome, occurs after enucleation of the prostate and arises from inside the prostatic capsule. As a rule this is arterial bleeding and can be controlled without difficulty. The capsular incision should be spread open with a long ring clamp and the prostatic bed inspected under direct vision, a suction tip being used in the prostatic field to keep the field dry. One or more spurting vessels can easily be seen, usually at the anterior or lateral aspects of the capsule. These are best clamped with an Allis forceps and tied with a figure-of-eight suture passed completely through the thickness of the capsule. Arterial bleeding is rarely seen at the posterolateral portion of the vesical neck.

There is always some degree of venous oozing from the floor of the prostatic bed, usually in the subtrigonal area. In most instances this will not prove troublesome and requires no suturing or ligating. A dry field can be maintained by keeping the suction tip in the prostatic bed while the prostatic capsule is being closed. In the occasional case in which this venous oozing is marked it can be sufficiently controlled by the use of an Emmett or Foley bag catheter, with the bag inflated within the prostatic bed. In the vast majority of cases, however, venous bleeding in the prostatic bed has not been a serious problem, and a straight Nelaton catheter, No. 22 F or 24 F, has been inserted, with satisfactory results.

An additional point to be emphasized with regard to the surgical technic is the necessity of removing an adequate wedge from the floor of the bladder neck after enucleation of the prostate. This should include the subtrigonal portion of the prostatic capsule, together with any adherent parts of the seminal vesicle that may be obstructive. In most patients the subtrigonal portion of the prostatic capsule is thickened and fibrotic, tending to form a definite barlike obstruction at the vesical neck. Dissecting out this part of the capsule with scissors and also removing any adherent vesicular tissue widens the neck of the bladder and minimizes the possibility of a postoperative contracture of the bladder neck.

To summarize the important factors in the surgical technic, retropubic prostatectomy can be performed without difficulty, with excellent exposure and with a good functional result if the following points are kept in mind: (1) gentleness in all manipulations; (2) a minimum of instruments in the operative field, and (3) excision of any obstructive tissue at the floor of the bladder neck.

Postoperative Complications.— 1. *Hemorrhage:* Postoperative hemorrhage is still the most important complication following any type of prostatectomy. In spite of the advances in prostatic surgery with the development of better technics, the control of infection, the increased use of blood transfusions and the improved methods of hemostasis, this complication remains the most serious hazard during the postoperative period. It is my clinical impression, however, that postoperative hemorrhage occurs less often with the retropubic approach than with the other procedures. This is due to the fact that better hemostasis is obtained because of the direct visualization and ligation of any bleeding vessels in the prostatic bed at the time of operation. If this phase of the operation is hurried or neglected, one is hardly justified in performing the retropubic procedure in preference to the others. Accurate hemostasis by ligation of bleeding vessels under direct vision is a basic advance in prostatic surgery contributed by the retropubic approach.

This is not meant to imply that postoperative hemorrhage has been eliminated as a complication of retropubic prostatectomy. Although it occurs less frequently after this operation, it has not been eliminated and is a potential complication in every operative patient. Maintenance of patency of the urethral catheter by intermittent irrigation is mandatory during the first twenty-four hours after the operation. Once the catheter becomes obstructed by clots, a chain of events is initiated that may lead to a return trip to the operating room. After extensive experience with all types of bag catheters, I have returned to the use of a straight Nelaton or Coude type catheter. The bag catheter is indicated only occasionally in retropubic prostatectomy, when excessive venous oozing is present in the prostatic bed. In most cases, however, this oozing is slight and a a straight catheter is employed. This offers the twofold advantage of more efficient drainage and greater ease in aspirating clots from the bladder. In spite of various modifications in bag catheters, too often some degree of kinking of the tip occurs when the bag is distended, resulting in partial blockage of the catheter lumen and inadequate drainage of the bladder. If clots do form and cause obstruction of the bag catheter it may be impossible to aspirate them, owing to the soft collapsible nature of the rubber. This difficulty is seldom encountered in a straight catheter, and any obstructing clots can be removed with a Toomey or bulb syringe. In the vast majority of cases intermittent irrigation of the urethral catheter is required only for the first twelve hours. After this time the catheter drainage material is light pink or yellow, and further troublesome bleeding seldom occurs.

Secondary bleeding may occur at any time during the postoperative period or even while the patient is convalescing at home. This is probably due to slough of some residual tissue which is partially devascularized and infected. It demonstrates the importance of having a smooth prostatic bed, free of tags of prostatic or capsular tissue, at the conclusion of the operation. With the excellent exposure afforded by the retropubic approach,· the prostatic bed can be inspected under direct vision and all residual tissue can be removed much more efficiently.

In most instances the bleeding is mild and will subside spontaneously if the patient is kept in bed for several days. Occasionally the bleeding is profuse, and the patient is unable to void because of obstruction by clots. In this event the patient should be hospitalized, if he has been at home, and an indwelling catheter inserted. All clots should be aspirated and the usual postoperative regime of periodic irrigation instituted. As a rule the bleeding will subside under this management.

The problem of postoperative hemorrhage becomes serious when the patient continues to bleed after all conservative measures have failed. One should never wait until the patient is in shock and almost exsanguinated before proceeding to more active therapy. There is a characteristic triad of symptoms that invariably signifies an emergency situation requiring immediate action. This consists of persistent suprapubic pain in spite of sedation, a palpable suprapubic mass and a poorly draining catheter. Irrigating fluid can be injected easily, but very little can be aspirated. The patient may have a normal blood pressure, but a rapid pulse and profuse sweating are noted. This clinical picture is due to a bladder distended with clots and irrigating fluid and to continued hemorrhage from the prostatic bed. If the patient is not already receiving blood, a transfusion should be started immediately and several pints of blood administered within the next eight hours. The patient is returned to the operating room, and, with light pentothal and nitrous oxide anesthesia, a resectoscope is inserted into the bladder. With a Toomey syringe or an Ellik evacuator, all the blood and clots are removed from the bladder. The huge quantity of clots thus aspirated is almost unbelievable and explains why further attempts at catheter irrigation would be a complete waste of time. It also demonstrates the excessive amount of blood that can be lost and emphasizes the importance of replacement by liberal blood transfusions.

The prostatic bed is then carefully inspected with the resectoscope. Any tags of prostatic or capsular tissue should be resected. One would expect to see large pumping vessels or bleeding sinuses, but, surprisingly enough, in almost all cases no bleeding points are seen after all the clots and blood have been evacuated. This is a curious phenomenon that lacks a satisfactory explanation. It has been confirmed by many urologists, however and it is unusual to see any marked bleeding in the prostatic bed once the bladder has been emptied. Occasionally a small bleeder is visualized, usually on the roof of the bladder neck, and this should be coagulated. When the return flow is clear the catheter is reinserted and the patient returned to his room.

The use of the resectoscope to control severe bleeding following any type of prostatectomy, including the perineal or suprapubic approach, has been recommended by Davis. This is a very satisfactory procedure and is much less traumatic than reopening the bladder and attempting to ligate vessels or to pack the prostatic bed. The patient is usually in shock and is unable to withstand any further abdominal manipulation. By utilizing the resectoscope one can control the bleeding adequately in almost all cases without subjecting the patient to an additional major operation.

The administration of large volumes of blood in the presence of persistent bleeding during the postoperative period is the most important factor in preserving the life of the patient. Any estimation of the amount of blood lost is difficult, and it is far safer to administer multiple transfusions than to risk a condition of irreversible shock by being too conservative. Death from hemorrhage should not occur after prostatectomy if the facilities of the blood bank are utilized properly.

2. *Catheter Dysfunction:* Since the postoperative course depends to a large extent on satisfactory functioning of the urethral catheter, proper drainage must be maintained at all times. One important advantage of the suprapubic as compared to the retropubic approach is that in the former operation the cystotomy tube is an excellent safety valve. A blocked urethral catheter presents no difficulty, since the suprapubic tube is adequate to provide drainage of the bladder. In operation by the retropubic route no such safety valve exists. If the urethral catheter does not drain adequately or irrigate freely, there should be no hesitation in changing the catheter. Poor drainage may result from kinking of the tip within the bladder or obstruction by clots or pieces of tissue. If the tip of the catheter has slipped under the trigone, drainage will be impaired. I have never encountered difficulty in reinserting another catheter when the Coude type is used. A large bore, preferably No. 22 F or 24 F, is preferable. If any doubt exists as to the proper functioning of the catheter, one should never delay changing it so that proper drainage is established.

3. *Urosepsis:* Postoperative infection of the urinary tract following retropubic prostatectomy occurs infrequently. A low grade fever, up to 101 F., may be present postoperatively, but the patient does not appear toxic and the temperature usually returns to normal within a few days. I routinely administer gantrisin during the preoperative and postoperative period. This drug has the advantage of being well tolerated, with few side effects on patients in the older age groups, and has a broad spectrum of effectiveness against organisms of the urinary tract. The clinical picture of acute ascending pyelonephritis, with recurrent chills and a high spiking fever, is rarely seen in the immediate postoperative period.

An acute febrile episode may occur after removal of the urethral catheter on the sixth or seventh day. The patient is voiding satisfactorily, and there is no residual urine. Within twenty-four hours after removal of the catheter the patient has a severe shaking chill with a high spiking fever. The cause of this complication is probably ascending pyelonephritis due to contraction of the bladder during micturition, with reflux up the ureter. It may also be due to absorption in the prostatic bed, with transient bacteremia. The urethral catheter should be immediately reinserted and left indwelling for several days. The absence of residual urine should not deter one from reinserting the catheter, since the primary purpose is to maintain continuous decompression of the bladder. The temperature will then return to normal levels within twenty-four to forty-eight hours, without any recurrence of this septic picture.

4. *Wound Infection:* For many years operative procedures in the space of Retzius were considered hazardous because of the danger of infection. With the advent of antibiotics, however, wound infection has not been a serious problem in retropubic prostatectomy. The importance of adequate drainage of the space of Retzius should be emphasized. A large Penrose drain should always be placed down to the prostatic capsule at the conclusion of the operation. This drain should not be removed before the sixth or seventh postoperative day, so that a sinus tract is formed to allow for the escape of any serum or pus. I have had 2 patients in my early cases of retropubic prostatectomy in whom an abscess formed in the space of Retzius. In each instance the Penrose drain had been removed on the third day and the wound had stopped draining on the fourth day. After the patients had gone home, fever and suprapubic pain developed, subsiding only when the abscess ruptured spontaneously through the wound, with evacuation of a large volume of pus.

Some degree of fat necrosis and infection is present in every patient who has undergone retropubic prostatectomy. Drainage of seropurulent material from the wound persists for three or four weeks in all instances. This is not accompanied by any generalized reaction and merely requires a daily change of a small gauze dressing. Abscess formation occurs only with insufficient drainage of the space of Retzius, which prevents the formation of a sinus tract.

5. *Suprapubic Urinary Fistula:* If the urethral catheter is not removed before the sixth or seventh day a suprapubic urinary fistula may occur, though rarely. Proper closure of the capsular incision is also an important factor in preventing this complication. A slight leakage of urine may be present in the occasional case, but this will usually subside within a few days. Should profuse urinary leakage occur, a urethral catheter should be reinserted for several days to allow the fistula to close. I have not encountered any persistent suprapubic urinary fistulas in any of my cases.

6. *Osteitis Pubis:* One of the principal criticisms of retropubic prostatectomy has been the allegedly high incidence of osteitis pubis. Some urologists were so discouraged by the frequency of this complication in their early cases that they soon abandoned the operation completely. My initial efforts were similarly disturbing, but with improvements in surgical technic and since discontinuing the use of deep retractors this complication occurs infrequently. My experience has paralleled that of many other urologists who report a relatively small incidence of osteitis in their more recent cases. Actually, in the past few years I have had as large a percentage of cases of osteitis pubis after suprapubic prostatectomy as after retropubic prostatectomy.

This is not to be construed as an attempt to minimize the serious nature of this complication. The patient with osteitis pubis suffers a painful disability for several months, which is only partially relieved by known therapeutic methods. Until the exact mechanism of the pathogenesis is learned, further efforts to eliminate this condition have but slight chance of success. In my opinion, however, the many advantages of the retropubic approach more than compensate for the very occasional occurrence of osteitis pubis.

7. *Stricture:* The incidence of urethral stricture after retropubic prostatectomy is rare, even with the use of a No. 24 retention catheter for six or seven days after the operation. I have seen occasional strictures at the urethral meatus, but these are not troublesome and respond well to a few periodic dilations. Postoperative contractures of the bladder neck have been reported, and some have been severe enough to require subsequent transurethral resection. This complication should not occur if an adequate wedge is excised from the floor of the bladder neck after enucleation of the prostate. I have been impressed with the frequent observation of a very narrow and contracted bladder neck associated with benign prostatic hypertrophy. The contracture is usually due to thickened and fibrous capsular tissue, which is present on the urethral side of the floor of the bladder neck; this is demonstrated by inserting the index finger into the bladder neck after enucleating the prostate and feeling a dense band of tissue on the floor causing an actual obstruction. The obstructing fibrous tissue should be resected, with a curved scissors, subtrigonally up to the seminal vesicles, in order to relieve the obstruction completely. Unless this part of the operation is properly performed, some degree of obstruction of the bladder neck may persist after the prostatectomy. I have had 1 patient with this complication who has a chronic retention of 6 to 8 ounces of urine and will require a transurethral resection of the bladder neck.

Another occasional cause of obstruction of the bladder neck associated with benign prostatic hypertrophy is hypertrophy of the interureteric ridge. For many years Dr. H. C. Rolnick has emphasized the importance of cutting a wedge from the interureteric ridge while performing a transurethral prostatic resection. This is equally important if a hypertrophied ridge is observed during retropubic prostatectomy. The ureteral orifices are easily visualized, and a wide wedge should be excised from the ridge between the orifices.

8. *Incontinence:* I have had an occasional patient with postoperative incontinence of urine. In each instance the incontinence was only partial and usually associated with stress or ambulation. In every patient complete control was established within a few months, after a course of periodic urethral dilations. I am convinced that any urinary incontinence following retropubic prostatectomy is primarily due to trauma to the external urethral sphincter, inflicted while enucleating the lateral lobes at their apices. Gentle handling of tissues is essential in all surgical procedures, and any rough manipulation in the region of the sphincter is likely to cause some damage to this structure. If enucleation of the gland is performed carefully, without undue haste or trauma, incontinence should rarely occur.

The postoperative use of a large bag catheter, with the bag distended with a large volume of water, within the prostatic bed may also be a factor in producing incontinence. The distended bag may be close enough to the urethral sphincter to cause excessive pressure and stretching of the sphincter muscles. The resultant weakness and atony of the sphincter are sufficient to account for partial incontinence that requires several months to become corrected.

SUMMARY

1. Clinical experiences with retropubic prostatectomy based upon a large series of cases justifies the general conclusion that this is a sound surgical procedure for enucleation of the benign hypertrophied prostate.

2. The basic advantage of this operation over the other approaches to the prostate is the improved exposure of the operative field, which permits a more thorough removal of all obstructive tissue and improved hemostasis under direct vision.

3. Postoperative complications, although less frequent, have not been completely eliminated and will require further experience and study on the part of urologists if the postoperative results are to be improved.

ZUSAMMENFASSUNG

1. Die auf einer grossen Reihe von Faellen basierten klinischen Erfahrungen mit der retropubischen Resektion der Prostata rechtfertigen die allgemeine Ueberzeugung, dass dieses Verfahren eine vernuenftige Methode zur Enukleierung der gutartigen hypertrophischen Prostata darstellt.

2. Der grundlegende Vorzug dieser Operation gegenueber anderen Zugangswegen zur Prostata liegt in der besseren Freilegung des Operationsfeldes, wodurch sich eine sorgmaeltigere Entfernung aller verlagernden Gewebsteile und eine bessere Blutstillung unter Leitung des Auges ausfuehren lassen.

3. Postoperative Komplikationen sind zwar in ihrer Haeufigkeit herabgesetzt worden, haben sich aber nicht ganz vermeiden lassen; zur Verbesserung der postoperativen Ergebnisse sind weitere Erfahrungen und Untersuchungen seitens der Urologen erforderlich.

RÉSUMÉ

1. Les expériences cliniques de prostatectomie rétropubienne basées sur un importante série de cas justifient la conclusion générale que cette méthode est excellente pour l'ablation de l'hypertrophie prostatique bénigne.

2. Le principal avantage de la méthode, comparée aux autres voies d'approche de la prostate, est qu'elle donne une meilleure exposition du champ opératoire, ce qui permet une ablation plus complète, et une hémostase sous contrôle visuel direct.

3. Les complications post-opératoires, bien que moins fréquentes, n'ont pas été complètement éliminées et demanderont encore des études et des expériences approfondies de la part des urologues afin d'améiorer les résultats post-opératoires.

RESUMEN

1. Las experiencias clínicas con prostatectomías retropúbica basadas en una serie grande de casos justifica la conclusión general de que es un procedimiento quirúrgico célebre para la enucleación postática benigna.

2. La ventaja básica de esta operación sobre otras esla buena exposición del campo operatorio, que permite una extirpación amplia de todo el tejido obstructivo y mejora la hemostasis bajo visión directa.

3. Aún cuando menos frecuentes no se han eliminado completamente las complicaciones postoperatorias. que requieren experiencias y estudios posteriores de los urólogos si son de mejorarse, los resultados postoperatorios.

RIASSUNTO

1. La prostatectomia retropubica è un metodo assai valido per la cura degli adenomi prostatici. Questa convinzione è basata su una vasta esperienza personale.

2. I principali vantaggi di questo intervento sono rappresentati dalla miglior esposizione del campo operatorio, che consente una puù accurata asportazione del tessuto tumorale e una perfetta emostasi.

3. Le complicanze post-operatorie sono diminuite di frequenza, ma non abolite, cosicchè ci si deve attendere ulteriori

miglioramenti dalla futura esperienza e da nuovi studi.

SUMARIO

1. A experiência clínica com a prostatectomia retropúbica, baseada num grande número de casos, justifica a conclusão geral de que se trata de processo cirúrgico definido para a enucleação da prostata hipertrofiada benigna.

2. A vantagem básica desta operação sôbre as outras vias de acesso à prostata é a melhor exposição do campo operatório, que permite maior extirpação de todo o tecido obstrutivo e melhor hemostasia, sob visão direta.

3. As complicações pés-operatórias, embora menos freqüentes, não foram completamente eliminadas e requerem ainda uma maior experiência e estudo por parte dos urologistas para que se obtenha melhores resultados pós-operatórios.

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The true spirit of conversation consists in building on another man's observation, not overturning it.

—*Bulwer-Lytton*

Never hold anyone by the button, or the hand, in order to be heard out; for if people are unwilling to hear you, you had better hold your tongue than them.

—*Chesterfield*

Monkeys very sensibly refrain from speech, lest they should be set to earn their livings.

—*Kenneth Grahame*

Quotation is a good thing, there is a community of thought in it.

—*Johnson*

War talk by men who have been in a war is always interesting; whereas moon talk by a poet who has not been in the moon is likely to be dull.

—*Mark Twain*

Infrapubic Prostatectomy

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NEW YORK CITY, NEW YORK

THE 1954 Congress, with its emphasis upon the prostate gland, brings to mind the early days of the specialty, when meetings were devoted to discussion of the comparative values of the transvesical versus the perineal approach in removal of the prostate gland. These were serious encounters, creating many bitter though respectful lifelong enemies, each contending that all prostates were amenable to his technic. In fact, neither side would even condescend to attempt the other's approach. Today, fortunately, surgeons are being trained in the many technics now available and attempt to select the procedure best suited to the patient, rather than make the patient fit the procedure.

The primary concern nowadays is the morbidity following prostatectomy. After more than thirty years' practice of urology and after performing or observing several thousand prostatic operations of various types, I am still of the opinion I have often expressed, namely, that one-stage prostatectomy in a patient who has had acute retention of urine or a large amount of residual urine over a protracted period is contraindicated. Such a patient should be subjected to a two-stage operation. Many surgeons will cite cases and state that they "got away with a one-stage procedure." Why gamble, when the mortality rate for the one-stage procedure is more than double that of operation in two stages on patients of this type?

With the reintroduction, during the late twenties, of a much improved endourethral surgical technic by Dr. Joseph Francis McCarthy, a third route for removal of the obstructing prostate gland took hold. Dr. McCarthy's enthusiastic presentation, filled with admonition as to the limited use and the danger of his technic when employed by those who had not been trained in instrumental urologic procedures, was frequently disregarded. This resulted in such papers as Alcock's "Mortality Report" and Lewis' "Endoscopic Resection Without Moonlight and Roses." These gentlemen would have enjoyed the moonlight and roses had they heeded McCarthy's warnings.

Surgeons must make progress. Many refuse to accept things as they are, and so Millin presented the retropubic approach to the prostate gland. His approach disregards all the earlier concepts by going through the venous plexus feared by most surgeons. Many favorable and unfavorable results have been reported. Millin's technic is here to stay, though I personally do not employ it, because of some poor results I have observed. Some members of the staff, however, are staunch supporters of the Millin method.

Recently, Ortego of Ecuador presented the ischiorectal approach to the prostate and has shown a beautiful motion picture of his technic. Elmer Belt's perineal approach is well established as being highly efficient. I employ his technic for perineal approach when indicated.

With this brief sketch of the past and future of prostatic surgery, one arrives at the infrapubic approach.

The infrapubic route to the prostate is

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Sept. 6-10, 1954.
Submitted for publication Oct. 6, 1954.

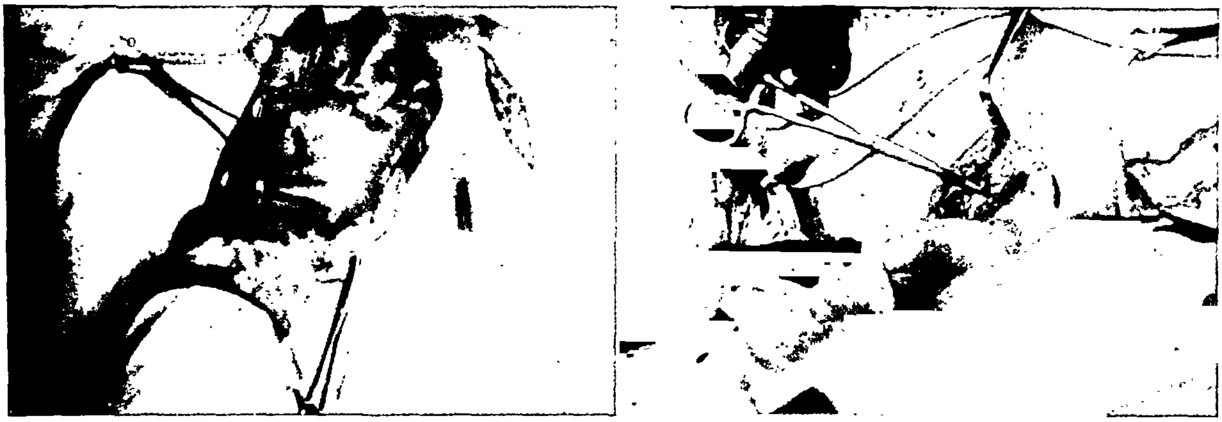

Fig. 1.—*Left,* incision over descending ramus of pubic bone. *Right,* attachment of triangular ligament to pubic bone exposed.

not new. After my presentation in 1951, Uhle of Philadelphia, in a personal conversation and independent of my publication, had reported on the treatment of carcinoma of the urethra by the infrapubic route.

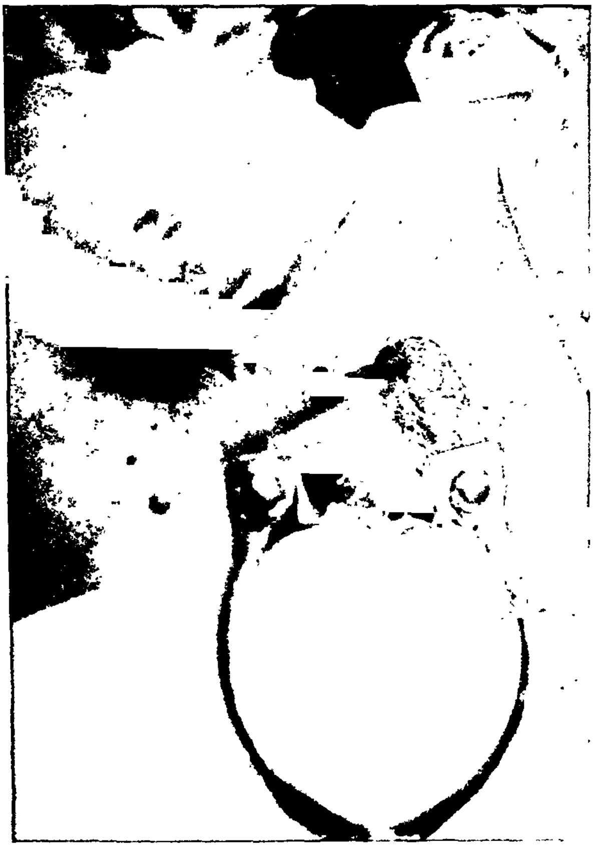

Fig. 2.—Levator muscles separated; Ritter retractor in place.

In 1908, Wilm described a method by which he went through the triangular ligament. Posner in 1912 and Russk in 1919 also described approaches through the triangular ligament. These differ from the approach to be described in that the structures of the perineum are not disturbed by the maneuvers here described.

In 1946 a patient was admitted to my service who had undergone an abdominoperineal resection for carcinoma of the rectum. After this operation abdominal dehiscence occurred, with postoperative hernia. This was repaired with tantalium mesh.

The patient was then troubled with retention of urine. A large benign prostate was present. The carcinoma had recurred locally, however, filling a good deal of the pelvis. Endoscopic resection had been attempted with poor results; therefore, the anterior triangle of the perineum, through which the prostate could be reached, was the only route left open.

On the basis of the anatomic knowledge and to avoid injury to the nerve and blood vessels, this patient was operated on by the infrapubic approach. Less reaction followed than the patient had had after the endoscopic procedure.

Because of the many methods already at hand and more coming into view, I withheld this presentation pending further experience. Now, having performed this operation more than fifty times and having had good results in these selected cases, it is timely, in my opinion, to describe the infrapubic route as an addition to the urologists' armamentarium.

Surgical Technic.—The patient is placed in a slightly exaggerated lithotomy position. A hollow metal tube through which a catheter can be passed, as suggested by McCarthy, is introduced *per urethram* for traction on the prostate. With this intraurethral prostatic retractor the prostate can be drawn down to the perineum. The scrotum and penis are drawn to the right and an incision 2.5 to 3 cm. is made parallel to and over the descending ramus of the left pubic bone (Fig. 1, *left*).

This incision is carried down through the skin and fascia to the attachment of the triangular ligament to the pubic bone.

The periosteum is incised and raised with the attachments of the structures forming the penis, together with the undisturbed perineal muscles, vessels and nerves (Fig. 1, *right*).

The levator ani muscles are exposed, and by blunt dissection the fibers are separated. This exposes the periprostatic fascia and the neurovascular bundle (Fig. 2).

The prostatic capsule may be incised under direct vision so as to avoid any of the periprostatic vessels or nerves. An intraurethral enucleation is now performed.

Fig. 3.—Bag catheter introduced *per urethram*; Solusponge cone adjusted.

The prostate having been removed, the edges of the internal sphincter can be drawn into the wound with long-handled Allis clamps, and active bleeders may be visualized, clamped and ligated. At this time the bladder cavity may be inspected.

A No. 24 Foley 3 cc. bag is introduced *per urethram* and into the perineal wound. The right side of the vesical wound may be approximated to the adjacent urethra if necessary.

A Solusponge cone is now adjusted to the catheter and introduced into the bladder with the Foley catheter (Fig. 3). The left side of the bladder and urethra are approximated and the prostatic capsule sutured (Fig. 4, *left*).

Should there be any excess bleeding, strips of Solusponge may be packed about the prostate (Fig. 4, *right*).

The edges of the periosteum are resutured to the pubic bone so as to replace all of the perineal structures. The subcutaneous tissues and skin are approximated. The wound heals readily (Fig. 5).

There has been much discussion of the causes of osteitis pubis. This complication was so frequently reported as following retropubic operations as to cause many surgeons to be reluctant in its employment. Beneventi, in an attempt to produce osteitis pubis in animals, traumatized the pubic bone and symphysis but was unable to reproduce the lesion.

I have observed osteitis pubis as a complication following all types of prostatic surgical procedures. It is probably due in fact to a vascular disturbance or to infection entering through the lymphatics or blood stream. Though the periosteum is raised from the descending ramus of the pubis, only 1 case of osteitis was [illegible]ed in my series of cases.

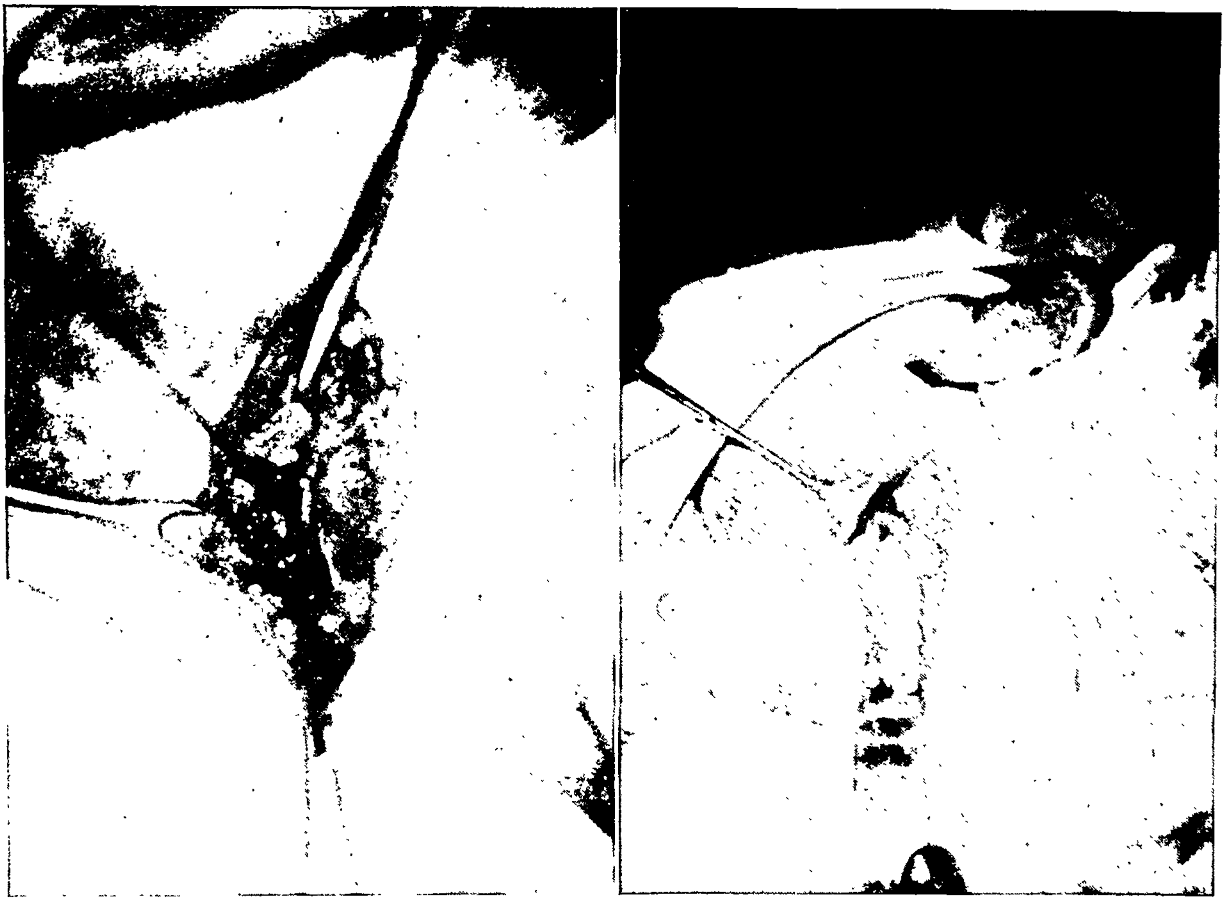

Fig. 4.—*Left*, prostatic capsule sutured. *Right*, Solusponge strips packed into periprostatic space for hemostasis.

SUMMARY

Infrahepatic prostatectomy offers the most direct route to the prostate gland.

The perineum, being diamond-shaped, is composed of two triangles; the posterior triangle is that in which the rectum is situated. The anterior triangle is really the urogenital triangle and is supported by the triangular ligament. Upon this structure the prostate rests. For unexplained reasons, urologists have avoided this area.

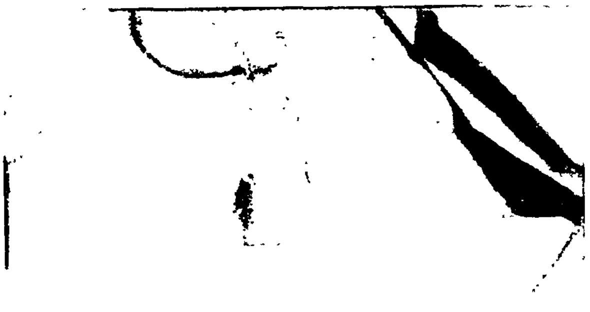

Fig. 5.—Appearance of incision two weeks after the operation.

There is no need of muscular, vascular or neural injury when the incision described is employed.

CONCLUSION

Advantages of the infrapubic approach to the prostate gland, in addition to the fact that it is the most direct route, are as follows: 1. Hemostasis is readily obtained, especially with the use of Solusponge. 2. Dependent drainage, when necessary, can be relied upon. 3. After removal of the prostate gland, the bladder may be thoroughly inspected. (Osteitis pubis occurred in 1 case, and 1 patient was temporarily incontinent.) 4. Since the nerve and vascular supply in this area is not disturbed, potency is not a factor.

This procedure is presented not to replace other methods of approach to the prostate gland but as a contribution to urologic surgery. At present there remains much to be desired in the effective practice of prostatic surgery.

RÉSUMÉ

La prostatectomie "infrahepatique" offre la meilleure voie d'accès à la prostate. L'auteur décrit la région dans laquelle il opère, et ne comprend pas que les urologistes aient jusqu'à maintenant évité cette région. Avec sa technique il ne provoque pas de lésion vasculaire, musculaire ou nerveuse.

La technique présente entre autres les avantages suivants: 1. L'hémostase est facile, surtout avec le Solusponge. 2. Le drainage dépendant est bon (quand il est nécessaire). 3. Après extirpation de la prostate la vessie peut être examinée à fond (il y a eu un cas d'ostéite du pubis, et un cas d'incontinence passagère). 4. La conductibilité vasculaire n'est pas troublée à ce niveau.

Cette technique n'est pas présentée comme devant remplacer les autres voies d'approche de la prostate, mais comme devant être ajoutée aux méthodes opératoires urologiques.

RIASSUNTO

La via sottopubica è quella più diretta per raggiungere la prostata ed eseguire la prostatectomia. Il perineo, di forma losangica, è composto di due triangoli: il posteriore è quello che ospita il retto, quello anteriore è il vero triangolo urogenitale ed è sostenuto dal legamento triangolare. La prostata giace su questa struttura. Gli urologi hanno sempre evitato questa regione per motivi non comprensibili. Quando si esegua l'incisine descritta non vi è possibilità di produrre lesioni muscolari, vascolari o venose. I vantaggi della via sottopubica oltre al più diretto accesso, sono i seguenti: emostasi facile, specie con l'impiego di spugne alla fibrina; drenaggio declive, quando necessario; facile esplorazione della vescica dopo la prostatectomia. Si ebbe un solo caso di osteite del pube e un solo caso di incontinenza transitoria. Nessuna questione nella potentia, dacchè non si producono lesioni nervose nè vascolari. Questo metodo non intende sostituirsi agli altri metodi in uso, ma viene descritto perchè gli urologi lo tengano presente.

RESUMEN

La prostatectomía infrapúbica ofrece la ruta más directa hacia la próstata.

Siendo romboideo el periné, se encuentra compuesto de dos triángulos, el posterior en el cual se encuentra el recto y el anterior urogenital que se encuentra sostenido por el ligamento triangular, sobre el cual descansa la próstata. Por razones inexplicables los urólogos han evitado esta área. No existe necesidad de lesión muscular, vascular ó nervioso, cuando se usa la incisión descrita.

La vía infrapúbica, además de ser la más directa, tiene las siguientes ventajas: 1. La hemostasis se realiza facilmente, especialmente con el uso de "solusponge." 2. Puede establecerse un drenaje de declive cuando se necesite. 3. Después de la extirpación prostática, puede inspeccionarse ampliamente la vejiga (en un caso ocurrió osteítis del pubis y en otro incontinencia temporal). 4. Ya que no se perturba la inervación y vascularización en esta área, la potencia no es un factor a considerar.

Este procedimiento se presenta, no para

reemplazar otras vías a la glándula prostática, sino para agregarlo a la cirugía urológica.

SUMARIO

A prostatectomia oferece a via mais direta para postata.

O perineo, em forma de losangulo, é formado por dois triangulos; o triangulo posterior é aquele em que se encontra situado o reto. O triângulo anterior é realmente o triângulo urogenital, sendo mantido pelo ligamento triangular; a postata repousa sobre esta estrutura. Por razões ignoradas, os urologista têm evitado esta área.

Quando é empregada a incisão descrita, não há necessidade de lesões musculares, vasculares ou neurais.

A via de acesso infrapubica à prostata, além de ser a via mais direta, apresenta as seguintes vantagens: 1) A hemostasia é obtida prontamente, especialmente com o uso de "solusponge." 2) A drenagem de postura é plenamente satisfatória quando necessária. 3) Após a retirada da próstata, a bexiga pode ser inteiramente inspeccionada. (Em um caso ocorreu osteite do pubis e um paciente apresentou incontinencia temporária). 4) Visto não haver perturbação do contingente nervoso e vascular nesta área, o problema da potência não entra em jogo.

Este método é apresentado não para substituir outros acessos à próstata, mas sim como uma contribuição à cirurgia unológica. Atualmente ainda há muito a ser feito antes que se atinja a utopia em cirurgia urológica.

ZUSAMMENFASSUNG

Die infrapubische Resektion der Prostata bietet den direktesten Zugangsweg zur Drüse.

Der rhombenförmige Damm besteht aus zwei Dreiecken, wovon das hintere den Mastdarm beherbergt. Das vordere ist das eigentliche urogenitale Dreieck und wird vom *Lig. triangulare gestützt.* Auf ihm ruht die Prostata. Aus unerklärten Gründen vermeiden die Urologen dieses Gebiet.

Bei Anwendung des hier beschriebenen Einschnitts liegt kein Anlass zur Verletzung von Muskeln, Gefässen oder Nerven vor.

Abgesehen vom direktesten Zugangsweg bietet die infrapubische Methode der Prostataresektion noch folgende Vorteile: (1) Blutstillung, besonders unter Verwendung hämostatischer Schwamm - Materialien, lässt sich leicht durchführen. (2) Eine etwa erforderliche Dränierung ist zuverlässig. (3) Die Harnblase kann nach Entfernung der Prostata sorgfältig inspiziert werden. (Ostitis pubis trat in einem Falle auf, und ein Kranker hatte eine vorübergehende Inkontinenz). (4) Da in dieser Gegend Nerven und Gefässe nicht geschädigt werden, spielen Potenzschäden keine Rolle.

Die Darstellung dieser Methode erfolgt nicht, um andere Zugangswege zur Prostata zu verdrängen, sondern um ein zusätzliches urologisches Operationsverfahren zur Verfügung zu stellen. Wir sind heute vom Ziel einer idealen Methode der Prostataresektion noch weit entfernt.

◆

He who has suffer'd you to impose on him, knows you.

—*Blake*

Total Management of the Patient with Cancer of the Colon and Rectum

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FROM time to time it is of interest to review and evaluate one's own effort in the field of colonic cancer.

Many excellent statistical papers dealing with diagnostic problems and the specific methods of their solution are available. This paper will deal with the problem as a whole, citing certain facts and procedures that have been helpful over a considerable period of years. It has always been my policy to remain flexible and to develop, discard, modify or adopt certain ways and means that have seemed best in my hands and in my community.

Approach.—When the patient is first seen it is well to know what the referring physician thinks and how much he has told the patient. As is well known, each patient presents a specific mental and medical entity peculiar to himself. This must be met and dealt with. It must be evaluated and calculated on the basis of the severity of the disease and what can be expected. When this has been done, it should be boldly but tactfully and honestly approached. Since the patient consults the doctor primarily to find out what is the matter with him, he is the one most concerned and should be given a statement of the facts commensurate with his understanding and his ability to manage the information.

I attempt at the same time to avoid producing mental states based on fear and uncertainty. Medicine and surgery have now arrived at a point where such a course may be pursued with some degree of accuracy. Many good papers have been written of late on iatrogenesic disturbances. Perhaps no other patient is more vulnerable to misstatement and half truths than is the patient with cancer. He and his family are the natural victims of the cancer charlatan, the pseudoscientist and the religious fanatic. Newspaper and magazine publicity can be both informative and a distinct menace. Many curious and susceptible minds seek out the warning signs and symptoms of cancer, and many fine lives are saved. The overall picture, however, makes a profound impression on certain persons, sometimes to the point of cancerophobia. These are the ones who behave best when given the facts. The educational program must be extended to include the worried husband or wife, family and occasionally friends. There are many diseases worse than cancer, and many of them are not nearly so vulnerable to attack.

The public must realize that cancer of the colon or rectum is a curable disease if diagnosed early, and that the incurable cancer patient does have a chance and can be satisfactorily managed.

On admission to the hospital the patient is put through an evaluation and indoctrination period of four or five or more days prior to operation. Thorough studies are made including anammestic, physical and regional examinations, with endoscopic study and biopsy if the lesion is [illegible]

From the Ferguson-Droste-Ferguson Hospital, Grand Rapids.

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Sept. 24, 1954.

Roentgenograms of the colon and chest and the necessary blood chemical tests are all informative. Special studies are made by the urologist, the gynecologist, the cardiologist or any other specialist indicated. The patient is then evaluated as a whole and reassured with the knowledge that everything is being done to help him.

A treatment program is started as soon as it is determined whether partial or total obstruction is present. If there is total or intermittent obstruction, decompression, with long or short tubes, and suction are instituted, and strict attention is focused on replacement of electrolytes. Specific measures are taken against inflammation in accessible lesions, in order to reduce obstruction and increase operability. The principle of osmosis is used in the form of hypertonic solutions applied with a return irrigator twice or more daily. Many so-called inoperable lesions can be made operable by this procedure.

If definite obstruction is not present, the patients with colonic cancer are given a teaspoonful each of castor oil and mineral oil to insure removal of the barium and to provoke a daily bowel movement without sufficient catharsis to amount to nutritional loss. Generous quantities of food high in protein and caloric value are given. Milk is not generally used, because it is a very bulky food and does not behave well in the adult bowel. Sugars are stored by means of a generous intake of corn syrup. Preoperative antibiotics are optional, but are advisable if segmental resection and anastomosis are contemplated. The clotting time of the blood is brought well within normal limits, and any patient with a protein lag, or any patient whose blood picture warrants it, is given whole blood on the day before the operation.

The Nurse Specialist.—Where a number of patients with colonic cancer are grouped, the nursing problem becomes less complex and the work of the nurse specialist becomes evident. These women become very proficient in the manipulation of tubes, the irrigation of colons and pelvises and the performance of the many small services necessary to the patients. They also explain the benefits of oxygen therapy and early ambulation and the ill effects of belching and air swallowing. All these points and many others serve to reassure the patient and prepare him with confidence for what is to follow. The surgeon makes an effort to visit the patient before the operation and briefly informs him of the many safeguards thrown about him. The patient is also acquainted with the idea that some responsibility rests on him, and that he is expected to abide by the rules as they are laid down during his recovery and rehabilitation. A barbiturate is administered early in the evening before the operation and early in the morning on the day operation is performed.

The Day of Operation.—A rested surgeon, confident that his patient has been properly prepared by an efficient team, approaches his task with far greater assurance than one who does not have these advantages and must depend upon his wits at the crucial moment. Likewise, the anesthetist, having reviewed the record and discussed the type of anesthetic with the patient the day before, approaches his responsibility with a certainty that makes for success.

It has been my practice since the early years of my experience to employ the urologist for all low-lying lesions of the colon and rectum, and in any situation in which a formidable pelvic tumor is concerned. As soon as the patient has been anesthesized the urologist looks into the bladder and inserts catheters into the ureters. This procedure has paid dividends on so many occasions that I am reluctant to discard it. It takes five or ten minutes of the anesthesia time at most, and it may save a half hour of operating time later.

The interior of the bladder has also been explored, and the surgeon is aware of the presence of complicating diverticula, extension of the tumor or new primary growths. I have encountered unsuspected bladder tumors in 2 per cent of my cancer patients, growing silently and unannounced. Such lesions, if unrecognized, may nullify the results of any well directed eliminative operation.

The Abdomen.—Exploration of the abdomen is carried out in a systematic manner. Most surgeons acquire a routine procedure for thorough coverage of this area. It usually consists of starting with the upper part of the abdomen and noting both lobes of the liver, the gallbladder, the spleen and the kidneys. Epicolic, paracolic and aortic nodes are examined, and finally the pelvis, the uterus and its adnexae or the prostate, which may be bulging into the cul de sac. The tumor proper is investigated in relation to the surrounding anatomic structures; adherent loops of bowel and spread of the tumor to deep lymphatics are observed. On the basis of this study the resectability of the tumor is considered, since no patient can survive unless the cancer is removed. It is the surgeon's responsibility to keep his patient alive as long and as comfortably as possible.

Almost all tumors are resectable, as has been demonstrated frequently, by modern methods—extension of the dissection and management of important physiologic processes. Massive involvement of the mesentery is likely to lower the surgeon's zeal, but spread to adjacent organs is no longer the problem it once was. Pelvic evisceration has doubtless come to stay. The patient with cancer extending to adjacent organs and without remote metastasis to the liver or lungs is given consideration. With the development of satisfactory urinary controls, these radical procedures will be used more often. The balance of opinion seems to be in favor of transplanting the ureters into a urinary pouch constructed from a segment of ileum. The surgeon must see a better than average chance of winning before subjecting his patient to this formidable procedure. With these facts well in mind, one is forced to reflect and ask oneself, "What is best for the patient?" When simple tumors are encountered and a cure is well within reach, wide and adequate removal is in order. For many years I have used the proctosigmoidoscope while the bowel is open, inspecting both proximal and distal segments to be sure I have included enough and to avoid leaving a lingering polyp that might otherwise defeat a good and adequate operation. The electric snare is always at hand as a part of my surgical armamentarium. The abdomen is closed after the definitive operation has been accomplished, and the patient is corrected physiologically.

Operative Notes.—Operative notes must include an opinion on the prognosis, on the site where one might expect the major spread and on those which are least likely to give trouble should a future colostomy or ileostomy become necessary. Many surgeons forget that some type of diversion procedure can often be done. Enteroenterostomy or enterocolostomy enables one to avoid the unpleasant and debilitating effects of intestinal stomas opening on the abdomen. No patient likes to lose the controlling effect of the sphincter without a very good reason. Massive resections leading to distressing diarrhea can be controlled very well, and the patient's morale is always best if the sphincters are intact. This consideration, however, must never cause the surgeon to sacrifice any of the elements of cure.

The final discussion as to the degree of success or failure is carried on with the family and eventually with the patient. He will often ask questions as soon as he has reacted. If the news is good I tell him, and the response is usually reflected in an excellent convalescence. If it is bad I suggest that he wait until he is a little stronger and is enjoying his food. The day always presents itself, however, and a good sound discussion of his present state and his outlook must take place. The patient's response is improved when he is given hope and reassurance that the surgeon has a few tricks left, even for the incurable. He must realize that he has had the best in surgical care and that reliance will now have to be placed on the productions of those unsung heroes, the master minds who work in research laboratories.

The patient treated by a combined resection of the Miles type is given special treatment. At the end of the second stage the pelvic cavity is washed, dried and sprayed with topical thrombin. A square of oiled nylon and 10 yards of vaginal gauze are left in the pelvic cavity as a pack. This is removed eighteen to twenty-four hours later, and the cavity is again washed and left open, without a drain. The wound is now clean and ready to heal. Most such wounds are entirely filled in and healed in four to six weeks.

A special portable suction arrangement with an irrigating mast and a rheostat for a portable light is used in postoperative care of the pelvic cavity. I am reluctant to give up this procedure in favor of closing the pelvis. I consider the end result decidedly more favorable when it is used.

Early ambulation is carried out vigorously. In this connection, the overdoses and unnecessary use of narcotics is discouraged. The readjustment of a dressing, changing of the patient's position, or arranging for more satisfactory mobility of the arm during administration of intravenous fluids may be the answer.

Final notations are made on the record for follow-up, through the record librarian. A card is placed in the "tickler" file, reminding the surgeon to communicate with the patient if he is negligent about returning or about visiting his family physician at stated intervals. Many are instructed to return three or four times the first year and others at longer intervals, depending to some extent on the prognosis and the distance they have to travel. In most instances a note to the family physician, telling him what to look for, is satisfactory. The patient is always advised to get in touch with me if there is anything puzzling or seemingly wrong. Roentgen films should be taken or special laboratory tests done once a year or as often as may seem necessary.

The Incurable Patient.—The incurable patient always presents a major problem, which varies with the organs involved. The pain factor is possibly the hardest to understand and combat. Roentgen therapy is of little importance for lesions of the colon. The folic acid antagonists are helpful in cases of spread to the liver, and the nitrogen mustards may be of some assistance when the lung is involved. Osseous spread is perhaps the most distressing, and there is little with which to combat it. Partial intermittent intestinal obstructions are easily dealt with. The various types of sympathectomy, when indicated, are dramatic, but the side effects are discouraging.

SUMMARY

Total management of the patient with colonic cancer is discussed, with emphasis on the methods that have been helpful. The author calls attention to the following points:

1. The need for education of the public is parallel to the need for the surgeon's taking the patient into his confidence.
2. Evaluation of clinical manifestations determines the procedure of choice and the extent of surgical intervention.
3. The advantages of grouping patients

and the use of the nurse specialist are emphasized.

4. Good follow-up records serve to complete the picture and should soon show an effect on the statistics.

RIASSUNTO

Vien preso in considerazione il trattamento del paziente affetto da cancro del colon e del retto, con particolare rifuardo ai metodi che si sono dimostrati efficaci. L'autore richiama l'attenzione sui seguenti punti:

1. La necessità dell'educazione del pubblico và di pari passo con la necessità, per il chirurgo, di guadagnarsi la confidenza del paziente.

2. La scelta del tipo di cura e l'ampiezza dell'intervento chirurgico sono basate sulla valutazione delle manifestazioni cliniche.

3. Viene sottolineata l'importanza sia di dividere i pazienti in gruppi sia di servirsi di infermieri specializzati.

4. L'accurato studio dei risultati a distanza serve a completare il quadro clinico e può mostrare grande influenza sui dati statistici.

RESUMEN

Se comenta el tratamiento total del paciente con cáncer del colon, resaltando los métodos que han sido de utilidad. El autor llama la atención sobre los puntos siguientes:

1. La necesidad de la educación pública es paralela con la del cirujano de atraerse la confianza del paciente.

2. La valorización de las manifestaciones clínicas determina el procedimiento de elección y la extensión de la intervención quirúrgica.

3. Se señalan las ventajas de la agrupación de pacientes y el uso de enferemeras especialistas.

4. Un buen registro de evolución postoperatoria sirve para completar la imagen y mostrará en breve su efecto sobre las estadísticas.

SUMARIO

É discutido o tratamento total do paciente com câncer do colo, salientando-se os métodos que se mostraram de valor. O A. chama a atenção para os seguintes pontos:

1. A necessidade da educação do público é paralela à necessidade do cirurgião em ganhar a confiança do paciente.

2. A avaliação das manifestações clínicas determina o método de escolha e a extensão da intervenção cirúrgica.

3. São salientadas as vantagens do agrupamento de pacientes e da enformagem especializada.

4. Registros apropiados de "follow-up" completam o quadro e devem mostrar efeitos sobre as estatísticas.

ZUSAMMENFASSUNG

Die Gesamtbehandlung von Kranken mit Dickdarmkarzinom wird unter Hervorhebung der Methoden, die sich als wertvoll erwiesen haben, erörtert. Der Verfasser macht auf folgende Punkte aufmerksam:

1. Die Aufklärung der Öffentlichkeit und die Fähigkeit des Chirurgen, das Vertrauen seines Patienten zu gewinnen, sind von gleicher Wichtigkeit.

2. Die Beurteilung der klinischen Erscheinungen bestimmt das einzu-schlagende Verfahren und den Umfang des chirurgischen Eingriffs.

3. Die Vorteile der Klassifizierung der Kranken und der Anstellung speziell ausgebildeter Krankenpfleger werden hervorgehoben.

4. Sorgfältige Niederlegung der Ergebnisse von Nachuntersuchungen tragen dazu bei, ein klares Bild vom Krankheitsverlauf zu gewinnen und werden in

Nahen Zukunft ihren Einfluss auf die Statistik erkennen lassen.

RÉSUMÉ

L'auteur discute le traitement et les différentes techniques opératoires du cancer du côlon, et insiste sur les points suivants:

1. Nécessité d'éduquer le public sur cette affection, et d'obtenir la confiance du malade.
2. Examen clinique déterminant la technique de choix.
3. Avantages d'une infirmière spécialisée pour ce genre de malades.
4. Anamnèse fouillée.

◆

Although she (Florence Nightingale) had laid down the most positive rule for her nurses that they must never question the doctor's orders, she herself had a very acute sense of the limitations of military medicine and surgery.

'We have lost the finest opportunity for advancing the cause of medicine and erecting it into a science that will ever be afforded.' The nurses might remain passive instruments, but she herself was too intelligent not to see that this war had shown up the deficiencies of the old medicine, and that its practitioners, instead of grasping this opportunity to learn something new, were groping blindly along the old ways. And now, having introduced nursing and welfare into army routine, she laid the foundations of an army medical school, there behind the lines. In fact she had become a personal sanitary and educational authority on her own. An officer wrote to England from Scutari that he had met only two real *men* in the near East—Omar Pasha, the Turkish Commander, and Miss Nightingale. No wonder those hospital quartermasters and army purveyors hated her.

They would have burned her like Joan of Arc but for the fact that the people of England were behind her. Her will had triumphed. She had accomplished her first purpose, the most difficult, for anyone who introduces a fresh idea into medicine: she had proved its necessity.

—*Williams*

Desmoid Tumors of the Sternocleidomastoid Muscle

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AND
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DESMOID tumors rarely appear in the sternocleidomastoid muscle.[1] On the contrary, 90 per cent are reported to occur in the abdominal muscles of women.[2] It is possible, however, that because of their relative benignity, an accurate rate of occurrence for cervical lesions fails to reach the literature; the pediatrician apparently accepts them without special notice in the course of practice,[3] thereby denying to the surgeon and the pathologist an opportunity for further study. Certainly these lesions are worthy of attention, for they are easily confused with other cervical lesions, and the question of treatment is still controversial.

Desmoid tumors of the sternocleidomastoid muscle usually appear as firm, fusiform swellings in the body of the muscle in infants 2 to 5 weeks of age; frequently there is a history of trauma at delivery. Torticollis to the affected side is the rule.

The cause is unknown. The consensus favors trauma, with resultant fibrosis. Opinion varies as to whether the fibrosis is secondary to hematomas, ischemia or inflammation.

The clinical diagnosis may be aided by the fact that a muscle tumor becomes fixed by the contraction of the muscle; in consequence, during relaxation, the lesion may be moved in a direction transverse to, but not in the line of, muscle fibers.[5]

Differential diagnosis chiefly involves other cervical tumors occurring in infants, viz., branchial cysts, lymphomas or inflamed lymph nodes.

Pathologically, desmoid tumors of the sternocleidomastoid muscle are similar to fibromas of striated muscle. On gross examination they are smooth and firm; cut sections have a dense, grayish white, cartilaginous appearance. Microscopic examination reveals muscle fibers in various stages of degeneration, separated by large amounts of fibrous tissue. Although desmoids are generally considered benign, some investigators regard them as fibrosarcomas, because of their tendency to local recurrence.[2]

The treatment of desmoid tumors of the sternocleidomastoid muscle poses a problem. The majority resolve spontaneously; resolution begins approximately at the fifth week and is completed after a period of weeks or months, generally without trace of the initial lesion. In a few, however, *residual torticollis remains. A* conservative approach, therefore, is usually advocated, with early institution of proper stretching exercises.[4b] Residual torticollis is attacked secondarily by surgical intervention. On the other hand, there are those who recommend excision early, before irreversible changes occur.[4c]

Two cases of desmoid tumor of the sternocleidomastoid muscle have reached our attention. The first was that of a boy

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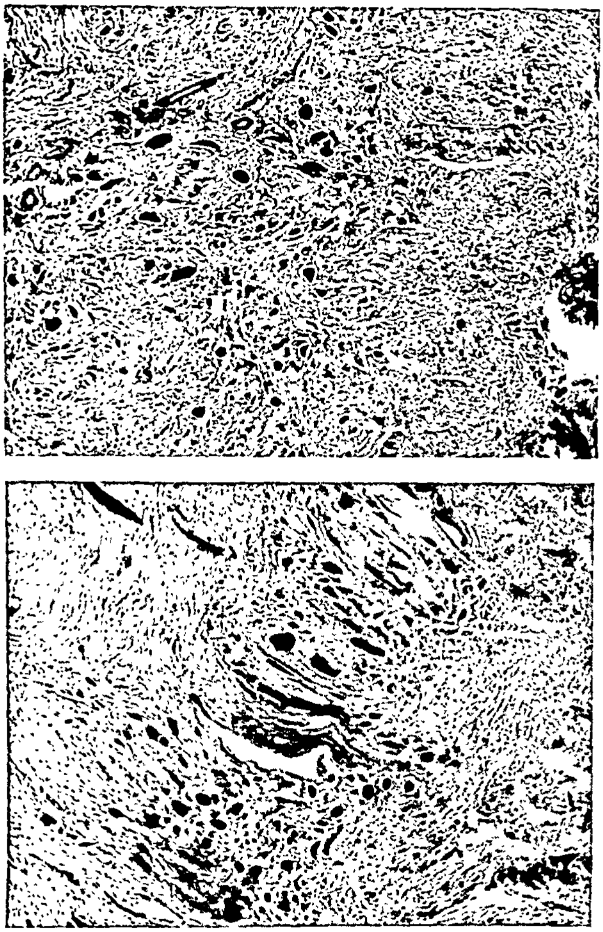
Submitted for publication July 24, 1954



Fibroma of striated muscle (desmoid tumor). Note early necrosis of striated muscle with active fibrous tissue replacement. The fibrous tissue is cellular in some areas, collagenous and nodular in others. Also note the many nuclei in some of the muscle fibers.

7 weeks old who was admitted to the Albert Einstein Memorial Center in April, 1951, with torticollis and a tumor in the right side of the neck. The swelling was noted two weeks after a breech delivery and showed rapid increase in size; its progression seemed a reasonable indication for excision biopsy. At operation, a fusiform tumor measuring 3 by 2 cm. was noted in the midportion of the sternocleidomastoid muscle. It was grayish white, firm and adherent to the surrounding tissues. The lesion was excised. Microscopically, it showed the characteristics of a desmoid tumor (see illustration). The child made an uneventful recovery and has since developed in normal fashion, without local deformity.

The second case was that of a boy aged 5 weeks, with torticollis and a firm tumor in the upper portion of the sternocleidomastoid muscle. Delivery had apparently been normal. The tumor had been noted two weeks prior to consultation. It had grown slowly until, at the time of consultation, it measured 1.5 cm. in diameter. Conservative treatment was advised. The tumor gradually disappeared over a period of several weeks, without residual torticollis.

SUMMARY

In general, it is considered good surgical practice to remove all discrete tumors for fear of actual or potential malignancy. A conservative approach should be applied to desmoid tumors of the sternocleidomastoid muscle, however, since spontaneous resolution is the rule. Operation is indicated under the following circumstances:

1. When there is any doubt with regard to the diagnosis. Differentiation from other cervical tumors in infants may be difficult.

2. If, after the child is 7 weeks old, the lesion continues to grow and is causing obvious deformity. If regression does not begin at about the fifth week, irreversible changes have probably occurred, resulting in a deformity that will necessitate subsequent surgical correction.

No case report can be found to substantiate the opinion that desmoid tumors of the sternocleidomastoid muscle may be malignant.

RÉSUMÉ

Il est en général considéré comme de bonne pratique chirurgicale d'exciser toute tumeur discrète par crainte de sa transformation maligne. Un traitement conservateur devrait pourtant être appliqué aux

fibromes du muscle sterno-cléidomastoïdien, étant donné que la résorption spontanée est la règle. L'opération est indiquée dans les cas suivants:

1. Lorsqu'il y a un doute quelconque quant au diagnostic. Il peut être difficile de faire la différenciation avec d'autres tumeurs cervicales chez l'enfant.

2. Lorsque, après l'âge de 7 semaines, la tumeur continue à croître et provoque une déformation évidente. Si une régression n'est pas constatée après la 5 ème semaine, des modifications irréversibles se sont probablement produites, causant une difformité qui nécessitera une correction chirurgicale.

On ne connaît pas de cas de fibrome malin du muscle sternocléido-mastoïdien.

RESUMEN

En general se considera buen juicio quirúrgico el extirpar todas las tumoraciones, temiéndose la existencia actual o potencial de malignidad. Un tratamiento conservador debe aplicarse a los tumores desmoides del músculo esternocleidomastoideo. Sin embargo, ya que la resolución espontánea es la regla la operación está indicada en las siguientes circunstancias:

1. Cuando existe duda del diagnóstico. Su diferenciación de otros tumores cervicales puede ser difícil en los niños.

2. Si después de las 7 semanas de edad la lesión continúa creciendo y produciendo deformidad. Si la regresión no empieza en la quinta semana, probablemente ocurren cambios irreversibles resultando en una deformidad que requiere corrección quirúrgica.

No se ha encontrado ningún caso comunicado que apoye la opinión de que los tumores desmoides del esternocleidomastoideo puedan malignizarse.

ZUSAMMENFASSUNG

Es gilt im allgemeinen als gutes chirurgisches Handeln, umschriebene Geschwülste zu entfernen, weil sie entweder schon bösartig sein oder sich bösartig entwickeln können. Bei bindegewebsartigen Geschwülsten des M. sternocleidomastoideus jedoch empfiehlt sich eine konservative Haltung, weil diese Geschwülste in der regel von selbst verschwinden. Ein chirurgischer Eingriff ist nur unter den folgenden Bedingungen angezeigt:

1. Wenn irgendein Zweifel an der Diagnose besteht. Bei Kleinkindern kann die Unterscheidung von anderen Geschwülsten des Halses schwierig sein.

2. Wenn im Alter von über sieben Wochen die Geschwulst weiter wächst und eine offensichtliche Entstellung hervorruft. Wenn die Rückbidung nicht um die fünfte Lebenswoche herum einsetzt, sind wahrscheinlich schon irreversible Veränderungen eingetreten, die zu einer Entstellung führen und eine chirurgische Korrektur erfordern.

Es findet sich in der Literatur kein Fall, der die Auffassung unterstützt, dass bindegewebsartige Geschwülste des M. sternocleidomastoideus bösartig sein können.

SUMARIO

De maneira geral, considera-se sadia orientação cirurgica a extirpação de todos os tumores de tamanho discreto, por temor de malignidade real ou potencial. Uma orientação conservadora deve ser contudo aplicada aos tumores "desmoides" do músculo esternocleidomastoideu, pois em regra registra-se sua resolução espontânea. A operação encontra indicação sob as seguintes condições:

1. Quando houver qualquer dúvida com relação ao diagnóstico. O diagnóstico diferencial com outros tumores cervicais em lactentes pode ser difícil.

2. Se após a idade de 7 semanas, a lesão continua a crescer causando deformidade evidente. Caso a regressão não se inicie em tôrno da 5ª semana, provàvelmente

enham ocorrido alterações irreversíveis, resultando uma deformidade que exigirá subseqüente correção cirúrgica.

Não foi ainda encontrado qualquer caso relatado que dê apôio à opinião de que os tumores desmóides do músculo esternocleidomastoideu possam ser malignos.

RIASSUNTO

In generale, veine considerata saggia condotta chirurgica l'asportare tutti i tumori nel timore di una malignità attuale o potenziale.

Una cura conservativa, tuttavia, può riservarsi ai *tumori desmoidi dello sternocleidomastoideo*, dacchè in essi la guarigione spontanea è la regola. *L'operazione è indicata solo nelle seguenti circostanze:*

1. Qualora vi sia qualche incertezza nella diagnosi. Può essere infatti difficile la differenziazione con altri tumori cervicali nei bambini.
2. Se—dopo 7 settimane—la lesione continua ad accrescersi e diviene causa di deformità evidente. Se la regressione non inizia dopo 5 settimane vuol dire che probabilmente si sono determinate delle modicazioni a carattere irreversibile, con deformità che dovrà essere sottoposta ad intervento chirurgico.

Non esiste alcum caso che convalidi l'opinione che i tumori desmoidi dello sternocleidomastoideo possano essere maligni.

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The doctrine of evolution, . . . interprets the vanishing of species and of sporadically variant individuals, as being due to maladjustment to the environment. This explanation has its measure of truth: it is one of the great generalizations of science. But enthusiasts have so strained its interpretation as to make it explain nothing, by reason of the fact that it explains everything.

—*Whitehead*

Editorial

Medical Practices Among the Navajo Indians

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BERKELEY, CALIFORNIA

AFTER several years of travel and study among the Navajo Indians, as the staff physician for the Rainbow Bridge and Monument Valley Expeditions, I have worked in the remote corners of Arizona desert. There are a number of marked differences in the incidence of diseases among the Navajos as compared with the white population. *Only the fittest among them survive.* Thus they are relieved of the burden of caring for such patients as fill our insane asylums, prisons, homes for the old, defectives and cripples.

The infant mortality rate is seven times that of the United States average—318 per 100,000 of population, as compared to 44 per 100,000. The death rate among Navajo children from diarrhea and enteritis is twenty times the rate among children of the total population. Despite this high rate, the Navajo population is increasing by 3 per cent every year. If a child reaches adolescence, his chances of life increase tremendously. Probably he will be healthy and well built. Some of these Indians reach a ripe old age.

Trachoma is the most common scourge. One out of every 10 has it. Fortunately, with the advent of antibiotics, there is some hope that this menace will disappear.

The other disease chiefly prevalent is tuberculosis. Nearly 50 per cent of the recorded Navajo deaths of persons over 20 are due to tuberculosis, and the mortality rate of this disease among them is ten times that of the general population.

It is remarkable that the Navajos, with little immunity to measles, diphtheria, influenza, and other communicable diseases, which easily become epidemic among them, have a very high natural immunity to scarlet fever. Dr. Salsbury, Medical Director of Sage Memorial Hospital at Ganado, Arizona, recently wrote me that he has never encountered a single case of scarlet fever among the Navajos and that he does not know of a doctor who has.

There is a great deal of interest among medical men in the incidence of cancer among primitive peoples. From figures given me by Dr. Salsbury, it is evident that the Navajos are not susceptible to cancer. In 25,000 hospital admissions and twenty years of service, Dr. Salsbury observed only 1 case—a case of mammary cancer in a man, which was inoperable.

Prior to 1940, venereal disease among the Navajos was rare. During the last war year, however, 30 per cent of the 15,000 who were in war plants and in the armed forces contracted syphilis, and the number of cases of gonorrhea became alarming.

Medical men are zealously searching for

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the causes of the various degenerative diseases, such as arteriosclerosis and arthritis. Naturally they focus their eyes on the primitive races to see whether some of our own ills are not due to a more refined and civilized way of living. As yet they have no definite answer. The Navajos have more than their share of sunshine. Their diet consists chiefly of corn, pine seeds, cactus, lamb and other such foods, none of which has so far been proved to cause arthritis in any form. Yet not only do they suffer from arthritis, their ancestors also were victims of the disease.

One never sees a bald-headed Navajo, though his scalp is often loaded with sand and dirt and is constantly covered with a hat or kerchief.

It is interesting to look back and compare the health of the Navajo Indians of today with those who lived in the same region and the same environment, a thousand years ago or more. The Indians who lived here in those days were the Basket Makers and the early Pueblos, whose dwellings and bones were being excavated by the members of white expeditions.

The people of this early period, living in compact quarters, undoubtedly had many communicable diseases with a high mortality rate. They must have had virus diseases, for which even today there are no specific antidotes.

Child mortality among the Cliff Dwellers must have been very high, for most of the mummies discovered are those of children. Even the adults apparently passed the age of forty only rarely. Yet today we say "life begins at forty."

I have seen many fractured skulls and other bones. I have seen long bones that healed with overlapped ends, thus shortening the extremity. I have seen spines with rheumatoid arthritis. Since this affliction is usually the result of infection in the body, one must assume that they suffered from infected gallbladder, chronically infected tonsils, abscessed teeth, or other infected organs. There is no doubt about their mouths; I have seen teeth full of caries and jaws with evidence of pyorrhea.

I have seen spines with the hypertrophic arthritis that usually develops with old age or hard work, and, since most of them died rather young, their hardships must have accounted for most of it. I have seen spines that were stiff from the base of the skull down to the coccyx, which means that the person was a hunchback and thus unable to bend or straighten. I have seen skeletons with osteitis fibrosa, in which bone had been replaced by fibrous tissue. The long bones had thus become bowed out and had later broken spontaneously because of their lack of strength.

Although they had no knowledge of sanitation and contagion, these ancient people did practice crude surgery. Some of their skulls reveal that trephining operations had been performed on them with stone knives.

The Navajos treat and cure primarily by creating hope in their patients, and therefore the use of most of their herbs is symbolic. The medicine man prepares an infusion from these herbs, but the amount that gets into the solution and the amount drunk by the patient are so small that one wonders whether it is not homeopathic medicine that they practice. Perhaps someday we shall discover that these herbs have some therapeutic value and why and how they "work." We ourselves have used salicylic acid for hundreds of years for pain and rheumatism, and it is only a year or two since we have learned the great value of its effect on the adrenal glands. In the long run it is almost like giving cortisone to one's patients.

I shall mention only a few of the common herbs used by the Navajo medicine men, though the list runs into hundreds:

Alum Root: The medicine man prepares a mush from its leaves and uses it as an astringent. He also mixes it with apoplappus and applies it with the aid of a heated stone to an aching tooth.

Atriplex: This is used to stop itching and for the cure of warts.

Butterweed: Butterweed is employed for relief of rheumatism, which the medicine man attributes to improper contact with menstruating women (the women are subject to joint trouble because of menstruation). The Navajo words for "menstruation," "rheumatism" and "hunchback" are identical, with only a slight difference in accent.

Buttercup: This is used in powder form every morning and evening for syphilis.

Chenopodium (pigweed): Pigweed is administered as a purge.

Greasewood and sagebrush: These are considered wonderful aids in childbirth. Watercress and silkweed are administered to the mother after the baby has arrived.

Datura (Jimson weed): This is the only narcotic the Navajo uses. The leaves and seeds, chewed up or made into an infusion, produce narcosis for minor operations and childbirth.

The patient or an assistant medicine man is given roots to chew. This induces a dreamlike state resulting in the subject's talking freely; it is believed that one may thus obtain some special clue to the patient's condition. Medicine men always have a little of it in their pockets.

Erigonium of James: This is used as a contraceptive.

Evening Primrose (big night bloomer): This variety of the primula is used for snakebite. Its leaves are ground with fuller's earth and mixed with corn pollen and water to bathe the sore.

Fumigation, like the herbs, is used symbolically. The patient is made to inhale a few breaths of smoke from the medicine fire. The medicine man first makes sure that the patient and his family compensate him in advance, for he knows that it is human to fail to appreciate things that are obtained easily or for nothing. Though the Navajo medicine man has not yet heard the word "socialized medicine," he certainly does not believe in it. He advises the patient and his family how to plan the details incident to the ceremonial, which takes many days and weeks of preparation. When the time of ritual is near, he sees to it that hundreds of persons gather around the patient for a feast, games and amusement.

He conducts pageant-like rituals with the help of his assistants. He chants and he prays for days and nights, often with many repetitions, to impress the patient. He further impresses him with fetishes, sandpaintings, incense and masks. He makes the patient repeat, over and over, certain autosuggestive verses and chants. He "takes the patient outside himself" by telling of beauty above and the beauty below, and of beauty all about him. He does all this with great sincerity and earnestness. In reality it is a form of religio-medicine that employs both psychology and psychiatry. The Navajo medicine men concentrate on the psyche. Knowing little or nothing of anatomy, psychology or bacteriology, they are unable to fathom the physical causes of disease. They have not yet heard of the germ theory. To them, diseases are manifestations of another kind of germ—an evil spirit or psyche, which they attempt to exorcise.

One often thinks of specialization as new; but specialization enters into the medical practice of the Navajos. The medicine man may be an expert in treating one kind of disease, while his fellow practitioner is an expert in another kind. No medicine man can master all the chants and sand paintings known in the tribe.

The Navajo medicine man has no office or hospital. He sees his patients in his hogan or in the patient's. If a complicated treatment is required, he asks the family to build a special hogan, in which he will treat his patient, prepare his sand paintings and perform his most important rites.

One of the most delightful theories, incidentally, is that no treatment will succeed without a bath. Baths are mentioned in the Navajo legends prerequisite to most treatments. The Navajo bath house is a miniature hogan. It is so low that one cannot stand up in it. It has no opening except its entrance. It will accommodate, at most, three to four persons crowded together in a sitting position with their legs crossed. Stones are heated outside and carried inside. The doorway is closed with a rug. After the patient has sweated for a long time, he comes out of the sweat house. The medicine man washes the patient's body and hair with suds obtained from roots of yucca baccata. The bath ends with a rinse in clear water and a rubdown with corn pollen.

A medicine hogan is like any other hogan, but it is built especially for the purpose of treating patients, and no one ever lives in it. The patient is brought into the hogan and placed on a sand painting, and his body is painted with colored sand.

I have seen men, women, and children thus treated. Once I saw a medicine man treated for arthritis. His treatment lasted seven days and seven nights, after which his crutches were thrown away.

In the Mud Dance, which lasted three days and three nights, I watched the treatment of the sick. First children, next women and finally men were treated. They paid the medicine man in advance; then they were placed on a sheepskin. The medicine man sprinkled corn pollen on the patient's ailing anatomic part, while a dozen assistants sang and danced in a frenzy to the beat of the tomtom.

An arthritic woman with a backache was placed on the sheepskin and sprinkled with pollen. As she lay flat on her face, a medicine man walked up and down her spine. (This may a good way of treating a slipped disc; who knows?) Then she was picked up and tossed up and down in the air, while the assistant medicine men shouted and danced in a sort of hypnosis.

Medicine men usually masquerade as deities. While dressed in this way they are believed to possess supernatural power and act as mediators before the gods.

Sand paintings are a necessary part of medical treatment and are always destroyed before sundown. They are beautiful, but they are preserved only in the memory of the medicine man who specializes in that particular field, and he passes on his skill to his apprentices.

The snake is a very important reptile in our own mythology and is the insignia of the medico. The Navajo, however, has no respect or use for a snake. If you want to keep a Navajo away from your premises, just hang a snake skin in your gateway.

The Navajo mind is rich in poetry and imagery, and the medicine man takes advantage of it. Unlike our exact and scientific thinking, his is relatively inexact, figurative and intuitive. His imagination finds expression in the sand paintings, which are full of color, and symbolism. His myths, whether chanted in verse or in prose, are replete with mysterious tales dealing with gods who always understand him.

Those who measure the Navajo only by the standards of a mechanized and precision-ridden world cannot believe that he can attain to such poetic expression of thought and feeling as he has put for instance, into the following two verses from the Mountain Chant. This is what the medicine man tells his patient during the treatment:

> The voice that beautifies the land!
> The voice above.
> The voice of thunder,
> Among the dark clouds
> Again and again it sounds,
> The voice that beautifies the land!
>
> The voice that beautifies the land!
> The voice below.
> The voice of the grasshopper.
> Among the flowers and grasses
> Again and again it sounds,
> The voice that beautifies the land!

What are the prospects of the Navajo Indians with regard to health, and what can we do to help? It is evident that the problem cannot be solved by more governmental hospitals, field doctors, nurses and drugs. Just now, what they need more than anything else is an extensive program in health education. As it is now, neither the hospitals nor the medical personnel on the reservation are being fully utilized by the Navajos, because of prejudice and lack of knowledge in matters of health. The sanitation in their everyday life also needs improvement, and a balanced diet should be provided to forestall the onslaught of communicable and nutritional diseases.

There is more hope now than ever before that greater efforts along these lines will be made, because the medical care of the Navajos and other Indians has recently been transferred from the Indian Bureau in the Department of the Interior, which was interested chiefly in the land and land rights, to the U. S. Public Health Service in the Department of Health, Education, and Welfare, whose greatest interest is in the services as mentioned in its title.

You like to walk round peculiar or important men as you like to walk round a building, to view it from different points and in different lights. Of the essayist, when his mood is communicative, you obtain a full picture. You are made his contemporary and familiar friend. You enter into his humours and his seriousness. You are made heir of his whims, prejudices, and playfulness. You walk through the whole nature of him as you walk through the streets of Pompeii, looking into the interior of stately mansions, reading the satirical scribblings on the walls. And the essayist's habit of not only giving you his thoughts, but telling you how he came by them, is interesting, because it shows you by what alchemy the ruder world becomes transmuted into the finer. We like to know the lineage of ideas, just as we like to know the lineage of great earls and swift racehorses. We like to know that the discovery of the law of gravitation was born of the fall of an apple in an English garden on a summer afternoon. Essays written after this fashion are racy of the soil in which they grow, as you taste the lava in the vines grown on the slopes of Etna, they say. There is a healthy Gascon flavour in Montaigne's Essays; and Charles Lamb's are scented with the primroses of Covent Garden.

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New Books

Books Received.—The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of any book.

Legal Medicine, Pathology and Toxicology. By Thomas A. Gonzales, Morgan Vance, Milton Helpern, and Charles J. Umberger. 2nd ed. New York, Appleton-Century-Crofts, Inc., 1954. Pp. 1349. Profusely illustrated.

Les Vomissements du Nourisson: Etude critique, Diagnostic étiologique, Indications thérapeutiques. Par Emilio Roviralta. Edition revue et augmentée par l'auteur en 1952. Adaptation française de Bernard Duhamel, d'après la traduction de Edouard Del Castillo Japuolot. Paris, Èditions Médicales Flammarion, 1952. Pp. 236. Illus.

Technique de la Chirurgie du Sympathique et de ses Infiltrations. Par O. Lambret, P. Razemon, et P. Decoulx. 4e éd. Paris, G. Doin & Cie., 1953. 115 figures et 4 planches.

Cystites Invétérées et Algies Pelviennes, leur Traitement par Infiltrations Anesthésiques et Neurotomies Chirurgicales. Par Raymond Darget et Rolland Ballanger. Paris, Masson & Cie., 1954. Pp. 118. Illus.

El Dranaje en Cirugía. Por Domingo Prat. Montevideo, Imprenta Rosgal, 1954. Pp. 166. Illus.

Aspectos Quirurgicos de la Estasis Biliar. Por J. Pi-Figueras, con V. Artigas y A. Llauradó. Madrid, Asociación Española de Cirujanos, n.d. Pp. 155. Illus. (III Congreso Nacional de Cirugía, Granada, Septiembre de 1953).

La Aortografía Abdominal. Por Ramon Carillo, Raul F. Matera, y Juan de Dulácska. Buenos Aires, Lopez & Etchogoyen, S.R.L., 1954. Pp. 114. Illus.

Sindromi Dolorose dopo Interventi Gastrici e loro Terapia Chirurgica. Per Luigi Leopoldo Bracco. Torino, Minerva Medica, 1952. Pp. 178. Plates.

Thorakoskopische Eingriffe am Nervensystem. Von E. Kux. Stuttgart, Georg Thieme. 1954. Pp. 130. 48 Teils mehrfarbigen Abbildungen.

Pratique de L'intubation intra-trachéale en Anesthésie. Par Henri Gibert. Paris, G. Doin & Cie., 1953. Pp. 188. 39 figures.

Pheochromocytoma and the General Practitioner. By Joseph L. DeCourcy and Cornelius B. DeCourcy. Cincinnati, DeCourcy Clinic, 1952. Pp. 165.

The Year Book of Obstetrics and Gynecology, 1954-1955. Ed. by J. P. Greenhill. Chicago, Year Book Publishers, 1954. Pp. 544. Abstracts.

Anuario Bibliografico Peruano de 1949-1950. Ed. by Alberto Tauro. Lima, Biblioteca Nacional, 1954. Pp. 427. (Ediciones de la Biblioteca Nacional-IX.)

A general bibliography. I. Books and pamphlets. II. Periodicals. III. Bio-bibliographies. IV. Bib. of librarianship. Fully indexed, with cumulative contents of the series.

Part I Contains a section on medical sciences.

Hugh Roy Cullen, a story of American Opportunity. By Ed Kilman and Theon Wright. New York, Prentice-Hall, 1954. Pp. 376. Illus. Biography of a distinguished medical benefactor.

Diseases of the Skin, for Practitioners and Students. By George Clinton Andrews. 4th ed. Phil. and London, W. B. Saunders Co., 1954. Pp. 877. 777 illus.

La Valvola Mitrale: Aspetti anatomici, fisiologici, clinici e chirurgici. Per Michele A. Chiechi e Charles P. Bailey (sic). Roma, Pensiero Scientifico Ed., 1954. Pp. 561. Illus.

The History of the Samaritan Free Hospital, with an Appendix on the London Hospitals and Infirmaries. By Arnold Whitaker Oxford. Cambridge, W. Heffer & Sons, Ltd., 1931. Pp. 96.

Patología del Estomago Operado: II Congreso Argentino de Gastroentoerología, Mar del Plata, 13-18 de Abril de 1953. Contributors from Sociedad de Gastroenterología de Buenos Aires, Asociación Argentina de Radiología, and Sociedad Médica de Mendoza. Buenos Aires, Ed. Universitaria, 1954. Pp. 482. Illus.

Verhandlungen der Deutschen Gesellschaft für Chirurgie, 70 Tagung, 7-11 April 1953. Berlin, Springer Verlag, 1953. Pp. 768. Illus. (Langenbecks Archiv für Klinische Chirurgie, Band 276.)

The Antiseptic (Madras), Golden Jubilee Number, April, 1954. Pp. 233-732.

Harofe Haivri, the Hebrew Medical Journal (New York), Vol. I, 1954. Pp. 256.

Michael Servetus: Humanist and Martyr. By John F. Fulton. With a bibliography of his works and census of known copies, by Madeline E. Stanton. New York: Herbert Reichner, 1953. Pp. 98. Facsimiles.

Despite his solitary life and lugubrious end, the drama of his last hour has made Servetus one of the great romantic figures in the history of medicine. He has become a symbol both of liberal theology and of free science, but his especial spiritual progeny are those who, like himself, are both humanists and physicians.

Dr. Fulton's contribution is a valuable addition to the arcana of this clan, doubly so because it comes at a moment of renewed production by Servetus scholars. It is, in fact, an example of that rarest of products, a scholarly work that is also a readable and fascinating narrative. Both amateur and general reader will come away with a grasp of the personality of this Catalan practitioner, of his importance to medicine, and of the main points of the Servetus "problem."

While the author holds no brief for Servetus' theology, his condemnation of Calvin is stern, with no thought of extenuation. At the same time he is deeply aware that the same accusing finger must point to acts and attitudes of the present day; this is the message of his brief preface, which must be read.

The monograph proper begins with a sketch of the medical background, particularly as it concerns Galen and Vesalius. Servetus' hectic career is next set down with rapid strokes. A third chapter presents his description of the pulmonary circulation and summarizes the evidence that Servetus was the first to present the concept to the western world. The author considers that Valverde and Colombo probably derived their ideas from Servetus, and that their claims of priority were for self-protection, since the Inquisition had proscribed the writings of Servetus. Due tribute is paid the genuine prior statement of Ibn an Nafis, but it is pointed out that this exerted no influence on the development of western medicine. The author's method may be cited as a model of historical judgment, taking into the account both the priority of invention and its influence on history. It may be mentioned that the author is indebted to Prof. O'Malley for the translation of the lesser circulation passage from the *Restitutio Christianismi.*

The Servetus bibliography is a major contribution in itself, including all Servetus editions, with a newly checked census of world holdings. As an example of its thoroughness, mention is made of a probable additional item (of Prof. Kot) not yet published at the time. Entries include detailed collation and contents of each item, with important and illuminating annotations. Title page facsimiles present the bibliographical details, and there are interesting facsimiles of the circulation passage, both in the MS (*ca.* 1546) and the *editio princeps* (1553).

The main bibliography is limited to titles *by* Servetus. The voluminous literature *on* Servetus is represented only by a list of background references cited in the monograph. These are carefully selected, however, to serve as a bibliographic key to most of the literature.

The little book may be considered essential in libraries of medical, theological or social history.

RICHARD LYONS, M.D.

Anatomy of the Human Body. By Henry Gray. 26th ed. Ed. by Charles Mayo Goss. Philadelphia, Lea and Febiger, 1954. Pp. 1480. 1202 illus., mostly in color.

Little need be said of the merits of Gray. The masterpiece of the nineteenth century anatomist and surgeon, and no less that of his illustrator, Vandyke Carter, has become a byword for generations of students and practitioners. It is a high tribute to the efforts of the present edition that he has preserved the merits of the original while introducing innovations required by advances in anatomic knowledge and the technics of investigation.

As a result, the changes in this edition are numerous and important. Perhaps the most substantial is the completely rewritten chapter on the peripheral nervous system, which brings together the results of the many recent publications on the subject. Although the order of presentation has been changed but little, it becomes more manageable with new headings and subheads. The treatment of the autonomic system has been greatly expanded.

Three significant alterations are seen in the order of presentation. The first is in the chapter on surface and topographic anatomy, which has been reviewed and moved forward to become the second chapter. The material on nasal anatomy has been relocated, becoming part of the chapter on the respiratory system, in keeping with the physiologic rôle of the nose as part of the respiratory tract. The anatomy of the olfactory organs, however, remains with the chapter on organs of sense. A third important and very convenient alteration is the inclusion of a separate section on the heart, preceding those on the arteries and veins.

The illustrative material has, of course, always been of immense importance in Gray. To the classic original drawings recent editors have added excellent roentgenograms, in keeping with modern knowledge of living anatomy. In this department, the present edition will be remembered for its fresh diagrams of microscopic anatomy from the cadaver, especially of the digestive system.

Another very important departure is the expansion of bibliographic notes and additional references. Full documentation of recent research is indeed a worthy goal, lest one tend to lose sight of the living, changing science in the midst of the mass of anatomic facts. In a reference work with the authority of Gray, it is essential to have this apparatus for timely bibliographic changes as an up-to-date record of the ever deepening alliance between anatomy and physiology.

It should be noted that nomenclature, as in previous editions, conforms substantially to BNA. Useful departures from this system are noted, however, and special changes in nomenclature are pointed out, as in the case of the visceral nervous system.

The format and craftsmanship of the volume deserve the *summa cum laude* reserved for books that will take a lifetime of constant hard use.

M. T.

Emergency Surgery. By Hamilton Bailey, with the assistance of Norman M. Matheson. Baltimore: The Williams and Wilkins Company, 1953. 6th ed. Pp. 938.

With the publication of the fifth and final part of this edition, it is possible to assess the thorough revision which the author promised in his preface and to compare the new work with the earlier edition, itself a thoroughgoing piece of revision.

That promise has been amply fulfilled. Additions and revision extending to every aspect of the book add to its power as a working tool, as they combine technics of proved value with the innovations of recent years.

The revolutionary innovation, of course, is the introduction of antibiotics into surgical practice. Mindful of a duty to the surgeons who will use this book, the author indicates, as succinctly as present knowledge allows, the changes in surgical procedure that have followed the use of these agents. The account of the "last minute appendix" reveals how conscientiously this duty has been performed. Owing to this and other advances, certain revisions of attitude have required entirely new chapters, e. g., on the treatment of burns.

At the same time, none of the earlier values have been sacrificed. These include a characteristic (and celebrated) compactness and lucidity in directions, a painstaking striving for clear, useful illustrations, and the hallmark of personal experience. All three have been retained and even transcended. New illustrations are remarkable for their careful choice, and the older ones have been improved.

The chief danger in such a work is that, with multiplying details, the book will resemble more and more a treatise on general surgery, and risk a loss of immediate usefulness in an emergency, for which it was and is intended. Careful indexing and arrangement and an economical style have overcome the problem in this instance. There have also been judicious omissions, as in the case of Trendelenburg's operation for pulmonary embolus.

The new collaborators and their chapter deserve special notice. They are: "Burns," by Conrad R. Lam; "Obstetric Operations," by F. R. K. Allen; "Surgery in the Tropics," by A. T. Andreasen, and "Surgery of Ear, Nose, and Throat," by Cecil P. Malley.

High commendation is also in order for Mr. Matheson, who assumed the editorial duties when the author's convalescence prevented him from continuing single-handed.

It must now be recognized that Bailey's book and the career of which it is the fruit are not merely professional achievements of the first order, but should be considered objects of national—and international—pride. Elsewhere we have devoted considerable space to the outstanding document that records British achievements in military surgery. A distinct part of this achievement must be traced to Bailey's labors and writings on war surgery, and to the clinical wisdom distilled in the editions of *Emergency Surgery.*

This edition will maintain its place as a foundation stone in modern surgery and in the libraries of surgeons.

M. T.

Varicosed Veins. By *R. Rowden Foote.* Butterworth & Co. Ltd. Pp. 240, with 186 illustrations.

The first edition of this revised work appeared in 1949. The current issue is a welcome addition, since it incorporates and appraises many of the old and new concepts. Foote has succeeded in a fair evaluation of many of the nebulous that have been expressed on this subject. Although some of his statements may be called dogmatic, this reviewer does not find the fact objectionable. Such dogma and attitude are sometimes necessary to stress the views of the author if he is to do more than merely present a survey. Foot is convinced that a high percentage of patients with varicosities can be cured, that a majority of the complications can be prevented and that *all* sufferers can be benefited.

Despite his preferences, he maintains that until the therapy of the annoying varix can be much more standardized, it is wise to adopt a middle-of-the-road course. The value of supportive and compressive treatment, although considered antiquated by some, still has its place in therapy.

One of the most intriguing chapters is the first, which is entitled "Some Historical Landmarks in the Treatment of Varicosed Veins." Much can always be learned from a review of such data.

Foote prefers to divide the veins that drain the lower éxtremity into four main groups:

1. The deep veins of the leg (femoral, popliteal, and tibial).
2. The superficial veins that empty into the femoral vein at the saphenous opening.
3. The superficial veins that empty into the popliteal vein.
4. The deep and superficial veins that empty directly into the internal iliac vein.

The practical application of such a classification may be questioned; however, the subject as presented here shows it to be of value.

A sentence that projects the flavor of this book is here quoted: "Routine stripping operations, the abolition of sclerosants and the prolonged hospitalization of our patients after major surgical attacks must be resisted." This reviewer is in complete accord with such an approach. The book can be recommended enthusiastically to anyone interested in the subject of varicose veins.

PHILIP THOREK, M.D.

The Human Brain in Sagittal Section. By Marcus Singer and Paul I. Yakovlev, Springfield, Ill.: Charles C Thomas, Publisher, 1954. 1st ed. Pp. 81, with 46 illustrations.

This monograph approaches the anatomy of the brain from a new angle, demonstrating the topographic relation of nuclei and fiber tracts in sagittal sections in contrast to the usual frontal and horizontal sections. The illustrations are outstanding. A complete index to the illustrations is included.

The book is a very valuable addition to the library of the anatomist, physiologist, neurologist or neuropathologist.

WERNER F. EISENSTAEDT, M.D.

Anatomy: Regional and Applied. By R. J. Last: Little, Brown and Company, 1954. Pp. 665, with 309 illustrations.

It is a courageous undertaking to write a book on anatomy that presents a new approach. Mr. Last has succeeded and has written a fine book. He has attempted to answer the many "Why's?" of anatomy. He has presented also a fresh approach to such subjects as the nerve supply to the limbs, the action of the suprahyoid muscles, and the mechanics of the menisci of the knee joint. The words "regional and applied" are valid. The applicability of the material presented is continually pointed out.

Three approaches have been used: the embryologic, the phylogenetic and the physiologic. This is a most practical manner of handling the subject.

Surgical operations are not described, since this is outside the proper scope of the work.

As the author states, one would be no worse off without a coracobrachalis muscle; much, however, can be learned from such a structure. Therefore the details, when they have a practical application, are emphasized.

This reviewer appreciates the "anatomic headache" that Mr. Last suffered when he had to grapple with the three terminologies anatomists have brought forward. He has had the intestinal fortitude to use eponyms of the old terminology and also to utilize the Birmingham Revision terms. He has been guided in his choice of terms by those which are in common use in everyday practice and everyday texts. This is indeed a sane approach.

The book is well written and amply illustrated. It can be recommended to both undergraduate and postgraduate students who are interested in anatomy.

PHILIP THOREK, M.D.

Tumors of the Jaws. By S. P. Srivastava, Agra, India: Agra University Press, 1954. Pp. 38.

This booklet contains a paper on tumors of the jaw which was presented by Dr. S. P. Srivastava at the Fifteenth Annual Conference of the Association for Surgeons of India, Agra, 1953.

The author describes a five-year series of tumors of the jaw which came under his observation. The total number is 406. This tremendous material is discussed with regard to diagnosis, pathologic features and therapy. It is not surprising that, with such a wealth of experience, the booklet provides a highly instructive review of the subject.

The book will be of great interest to any physician and pathologist who deals with diseases of the jaw.

WERNER F. EISENSTAEDT, M.D.

Anesthesia in General Practice. By Stuart C. Cullen. Chicago: The Year Book Publishers, 1954. 4th ed. Pp. 312.

This manual was developed originally from lectures on anesthesia for medical students. Consequently, fundamental principles rather than technical details are emphasized. Changing concepts, increasing knowledge of and experience with drugs used in anesthesiology and their application in the past few years are reflected in this new edition.

The chapters on depressant drugs, inhalation agents and technics have been rewritten to incorporate advances in basic understanding of the newer agents. These advances have led to the inclusion of a new chapter on ventilation and a revision of the subject of muscle relaxants. The other chapters, with minor exceptions, are practically unchanged from those of the earlier editions.

Because of the usefulness of the class of drugs described to other fields of medicine, this book should be of interest to the nonspecialist in anesthesia. Dr. Cullen's lucid style contributes to ease of understanding and enjoyment of reading. On the whole, this is a valuable book that continues to be of service because of the changes that keep it up to date.

ANITA E. RAPOPORT, M.D.

The Mechanism of Labour. By Erik Rydberg. Springfield, Ill.: Charles C Thomas, Publisher, 1954. Pp. 180.

This book presents the author's ideas concerning the mechanism of labor. For many years he has maintained that the movements of the fetal head during labor are determined chiefly by the shape of the baby's head and the shape, elasticity, and plasticity of the wall of the soft birth canal. In this book Rydberg presents evidence based on very ingenious experiments, and also on roentgen studies of the position of the baby's head before and during descent and the postural changes of the child during labor. To bolster his ideas, Rydberg also used motion pictures, showing the mechanism of delivery of the shoulders, and the behavior of the infant's head after its expulsion from the vagina.

There are six chapters in the book. 1. Labour from the Mechanical Point of View. 2. On Explanations of the Mechanism of Labour. 3. The Shape of the Foetal Head. 4. Experiments with Models. 5. Application of the Previous Considerations to Actual Labour. 6. Extended Mechanical Analysis of the Experiments with Models.

There is an extensive summary and, in addition, a long, valuable list of references dealing with the mechanics of labor. In many parts of the book the author pays homage to the pioneers in this field. This historical review alone is an indication of the thoroughness with which Rydberg studied the literature. The book is written in simple, clear English. The illustrations are beautiful, instructive and well reproduced. Rydberg is to be congratulated for his contribution.

J. P. GREENHILL, M.D

Cuartas Jornadas Argentinas de Cirugía Torácica [y Primeras Jornadas Latinoamericanas del Tórax], 2—7 Julio, 1951. Organizadas por la Sociedad Argentina de Cirugía

Torácica. Buenos Aires, 1953. Pp. 509. Illus.

***Quintas Jornadas Argentinas de Cirugía* Torácica . . . Primer Congreso Argentino de Cirugía Torácica, 8—12 Septiembre, 1952.** Organizadas por la Sociedad Argentina de Cirugía Torácica. Buenos Aires, 1953. Pp. 277. Illus.

While these meetings attest primarily the achievements of thoracic surgeons in the Argentine Republic, it is gratifying to note the international import they have acquired. This is signalized by the announcement that the series of 1951 also included a newly organized Latin-American conference on the thorax. That this is more than a mere formality is evidenced by contributions from various European and American centers—papers of high excellence from Brazil, Uruguay, Paraguay, Ecuador, the United States, France, Italy, and Germany.

The proceedings for 1951 present 71 papers; the 1952 series, 26. The subjects range from anatomy of the thorax to physical therapy and represent the fields of cardiology, pneumonology, endoscopy, radiology, and anesthesia, to name but a few. As with all such conferences, the papers vary greatly in length, intent and treatment. The full-dress presentations are complete with case reports, statistical tables and bibliographies. Illustrations include roentgenograms, diagrams, histological slides and portraits.

Great credit is due the organizers, officers, and committee members, whose names are duly recorded, and who receive tribute in the inaugural remarks of the Honorary President and guiding spirit of these meetings, Dr. Jorge Taiana.

M. T.

Religion is the vision of something which stands beyond, behind, and within, the passing flux of immediate things; something which is real, and yet the greatest of present facts; something that gives meaning to all that yet waiting to be realized; something which is a remote possibility, and passes, and yet eludes apprehension; something whose possession is the final good, and yet is beyond all reach; something which is the ultimate ideal, and the hopeless quest.

—*Whitehead*

Abstracts from Current Literature

PROCEEDINGS OF THE THIRD MEDICAL CONGRESS OF THE FRENCH-SPEAKING COUNTRIES OF THE ANTILLES, DEC. 15-19, 1953

Translated from the French by
Ulysses G. Dailey, F.A.C.S., F.I.C.S.

In this issue of the Journal our regular department of surgical abstracts yields with pleasure to our colleagues in the Antilles, whose fine work is indicated by the following abstracts presented at the Third Medical Congress.

Cryptogenetic Hyperthermia, by Dr. Pierre Salgado. Salgado discusses the persistent fevers so often observed in Haitian children, listing the following types: 1. Upper respiratory postinfluenzal infection of the upper part of the respiratory tract, with foci localized in the pharynx, tonsils, adenoids or middle ear. 2. Infections of the urinary tract. 3. A low-grade primary tuberculous focus (observed occasionally). 4. In very young infants and nursing children, dehydration due to inadequate allowances of water (Finkelstein). 5. Ascariasis and malaria. (These have been noted especially in Haiti.) Twenty consecutive cases of fever in children were studied. The majority were in apparently good health, aside from the febrile course. In many, the element of allergic, alimentary, respiratory or cutaneous disturbance was evident. In 13 (more than half) of the cases, laboratory examinations, including tuberculin tests, hemograms, pulmonary roentgenograms, urinalysis, blood culture and examination of the stools for parasites, gave negative results. Two of the children had a 75 per cent lymphocytosis (75 per cent); 2 others had pyuria, 1 had ascaris, and still another had mononucleosis. In 5 the fever disappeared when milk was omitted from the diet. In 2 the fever was proved to be associated with allergy to Pablum. In the absence of a discoverable focus, and especially after elimination of active infection by therapeutic means (antibiotics-penicillin, aureomycin, terramycin), allergy is assumed to be the basis of persistent hyperthermia in most cases. Further study will be required to formulate a more definite hypothesis as to the cause.

The author notes that it is important to assure parents of the innocuousness of low grade persistent fever in children after elimination of serious disease by diagnostic study and antibiotic therapy, and to advise mothers to abandon the daily taking of temperatures.

Treatment of Intestinal Parasitosis, by Dr. Pierre Blanchard. In the cases comprising the parasites most frequently encountered were ankylostomes, ascaris, trichocephalas, oxyures, bilharzia and the anguilbules. Taenia coli, trichomonas and Balantidium coli were far less common. This article, together with the succeeding one.

Anklylostomosis in Guadeloupe, by Dr. Eugene L'Etange, with bibliography, forms a rather broad résumé of the subject of tropical parasites and the practical aspects of intestinal parasitology in the Caribbean countries. They are worthy of a more extended review than is feasible here.

Nervous Manifestations of the Neurotoxic Syndrome of Pernicious Malaria in Haiti, by Dr. Bernateau. Dr. Bernateau, on the basis of his experience in the medical service of the Haitian army, as well as in his private practice, refers to the multiple clinical manifestations of pernicious paludism and presents detailed case histories representative of each. He concludes:

"1. Severe malarial crisis causes a neurovegetal desequilibrium which manifests itself under the form of cephalgia, myalgia convulsions, algidity, and coma.

"2. Fever often accompanied by chilly sensations, or even actual chills, is preceded by or follows the neurotoxic syndrome.

"3. The algid and comatose forms, are dependent upon the shock syndrome and suprarenal insufficiency.

"4. In the crises of pernicious malaria, sero-cytologic changes may be observed.

"5. These crises of pernicious malaria may be considered the eventual cause of arterial hypotension and the pseudo sexual impotence often observed in young malarials.

"6. The malignant character of the neurotoxic syndrome constitutes a morbid entity independent of the chronicity of nervous lesions, or of the number of parasites.

"7. Therapeutically, Quipenyl injectable, and Nivaquine by mouth and vitamins B and C, render inestimable services.

"8. The mortality is relatively low in the middle aged, but is rather high in children and in the aged living in regions where medical assistance is not easily available."

The Treatment of Crises of Pernicious Malaria by Combination of Specific Therapy With "Largactil," by Dr. Camille Fidelin. Fidelin dwells upon the severity and high mortality of pernicious malaria in tropical countries and the inadequacy in most instances of the usual specific medication. Hence the necessity for effective adjunct agents. For this he has used a new so-called neuroplegic drug Largactil (4560 RP). Although the number of cases is admittedly small, because of favorable results, the author recommends the agent for further trial by his confreres.

Report From The Sixth International Congress On Leprology, by Dr. Etienne Montestruc. The Congress was held in Madrid, Oct. 3 to 12, 1953. Two hundred and seventy-five delegates from 45 different nations were present. Five commissions of nine members each were named to study the different problems:

1. Classification
2. Therapeutics
3. Epidemiology and prophylaxis
4. Immunology
5. Social aspects.

Montestruc found the present Congress much less interesting than the preceding Fifth and found much to criticize in the order of procedure, with the multiplicity of classification and the needless complexity of arrangements. Of interest for the general physician are: (1) the confirmation of the therapeutic specificity of the sulfones for all forms of leprosy and (2) the advise that chaulmoogra (formerly the sheet anchor) be finally abandoned in the treatment of the disease. Other agents, thiosemicarbazones, isonicotynyl hydrazide, streptomycin, ACTH and cortisone, have either been insufficiently studied or are controversial and, in any case, inferior to the sulfones. The extensive reports by the commissions are of interest chiefly to leprologists.

Action of Vitamin B_{12} on the Osteoporoses, and on Osteoarthritis and Periarthritis, by Dr. Camille Fidelin. On the basis of its powerful antianemic and anabolic action, Fidelin has employed vitamin B_{12} with good results in the treatment of a number of cases of osteoporosis, osteoarthritis and periarthritis, paralleling the favorable reports by recent American authorities, who in addition have employed the agent for retarded callus formation in fractures.

Mild Forms of Hyperthyroidism, by Dr. Victor Noel. Professor Noel calls renewed attention to the numerous diagnostic pitfalls connected with the *formes frustes* of hyperthyroidism, and discusses methods of recognition of obscure cases. His article will be reviewed *in extenso* in a later issue.

Experiences With Potentialized Anesthesia, by Dr. Constant Pierre-Louis *"Anesthesia potentialisee"* in French medical literature refers to the employment of mixtures of different drugs of synergistic or corrective action to produce greater efficacy and reduce untoward effects. The idea is not very recent, but the author credits Laborit of the French School of Anesthesiology with coordinating the diverse facts and formalizing the practice. The role of psychic shock in surgical anesthesia is discussed, and reference is made to Crile's theory of anoci-association. The influence of epinephrine, acetylcholine and histamine, with their corresponding antidotes in the more recent notions concerning surgical shock, are referred to. Forty-four cases of major operations form the basis of the clinical report, the details of which will be made the subject of a later review. The concluding statement is that "potentialized" anesthesia represents an effort to prevent neurotoxic hormonal discharges, to reduce the quantity of general anesthetics required for surgical anesthesia, which must be considered the main factor in diminishing or abolishing the risks of operation.

First Steps in Modern Anesthesiology in Martinique, by Dr. Georges Barbe. Modern methods of anesthesia were introduced in Martinique on Dec. 4, 1952, although practitioners of surgery there had been cognizant of the recent developments abroad. Dr. Barbe vividly describes the first actual practice of modern "closed" anesthesia (premedication with morphine, atropin and phenergen one hour before the intervention, beginning with intravenous Pentothal and repeated at intervals, "potentialized" by cyclopropane and a small quantity of ether). The operation was a nephrectomy. The entire personnel, as well as the patient, were surprised and pleased with the immediate and late postoperative course. From December 1952 to December 1953, 389 patients were operated upon without mortality within forty-eight hours; in other words, with no deaths attributable to the anesthesia.

The author describes in detail the methods employed in the various types of cases.

The Orthopedic Service at the Haitian General Hospital, Port-au-Prince, by Dr. G. Leon. This service has 48 beds. The report is presented in three charts:

The first depicts general activities:

1. Outpatients	1,715
260 emergencies were hospitalized	
Total hospitalizations	541
Number of Operations	241
Bed apparatus	80
Plaster casts	917
Velpeaus	41
Figures of eight dressed for clavicule	29
Aspiration of joints	74
Adhesive dressings	78
Deaths	17
(6 following surgery)	

2. Diagnostic Table
   Comprises 53 pathologic entities
3. A large variety of clinical entities is depicted in the third table, of which 650 were fractures. Eighty-nine were surgically treated.

Bone Graft for Delayed Union, by Dr. Charles St.-Cyr (Martinique). In this case, that of a 12-year-old boy, pseudoarthrosis of an infected fracture of the femur had existed for more than a year. A tibial graft from the father was applied, followed by a perfect "take" and disappearance of the disability.

The author pleads for the establishment of more blood banks in Martinique.

The Place of Enervation, (Tavernier's Operation) in the treatment of Painful Hip, by Dr. A. Miot. After a scholarly and detailed discussion of coxalgia in its multiple forms, and the various measures designed to relieve them, the author concludes on the basis of his experience that Tavernier's operation (peripheral neurotomy) is a valuable therapeutic procedure in properly selected cases. Etiologic cure is not to be expected, but the comparative lack of risk and the sharp relief of pain following the operation justify its employment as a palliative procedure.

Vertebral Graft in Spondylolithesis, by Dr. Charles St.-Cyr (Martinique). A war veteran who had suffered for more than seven years with sciatic neuralgia following a fall, and who had been considered a malingerer, was finally proved by roentgen studies to have slipped the fifth lumbar vertebra onto the sacral.

Bilateral tibial grafts were applied from the fourth lumbar to the third sacral vertebra. Postoperative antibiotics were given, with removal of sutures on the tenth day. Union *per primam* occurred. He was kept in bed two months, and the cast was removed at the end of the third month. The pains disappeared, and control roentgenograms showed the grafts in good position and well calcified.

The vertebral graft thus applied is considered superior by the author to other methods involving a transperitoneal approach, although he recognizes the fact that there is lack of unanimity on this point.

Bilateral Suprarenalectomy for Bone Metastases in Cancer of the Breast, by Drs. de Seze, Debeyre, Courjaret, Robin and Denis. Crediting the American writers Huggins, Thorn and Pearson with early employment of suprarenalectomy in the treatment of bony metastases, Professor de Seze and his collaborators report results in six cases, the oldest postoperative history being nine months.

Of the 6 patients, 2 were operated upon too recently for study. The other four were two and a half, five and a half, five and nine months beyond operation at the time of the report; hence no definitive conclusions could be drawn. Nevertheless, the authors consider themselves justified in expressing the following impressions:

1. The evolution of cancer is not delayed, and may even be accelerated, by suprarenalectomy.
2. Pain is definitely relieved.
3. The fact stands out that suprarenalectomy, technically, is a perfectly feasible operation without drastic risk, even with a very weak patient.

Metabolic equilibrium, postoperatively, is easily maintained by the daily ingestion of small doses of Cortisone (25-50 mg.) to which are added small doses of Doca.

Complications of Gastrectomy, by Dr. A. Leveque. From January 1948 to July 1953, 178 gastrectomies had been performed on Professor Leveque's service of which 15 were for cancer and the rest for gastroduodenal ulcer. Four were total, and the remainder were different types of subtotal gastrectomy.

One hundred twenty-four were performed for duodenal ulcers, of which 27 had perforated into the pancreas.

Thirty-three were done for gastric ulcer. In 5 cases the exact location of the ulcer was not determined.

In 1 case, gastrectomy had been preceded by a degastroenterostomy for marginal ulcer. In another, gastrectomy was performed for megaduodenum.

Not included in the preceding figures were a number of cases of futile exploration, and still others in which, because the stage of the disease (usually cancer) and/or the condition of the patient precluded surgery.

The following complications are discussed:

Postoperative vomiting
The "dumping syndrome"
Duodenal fistula
Internal hernia
Injury to the common duct
Postoperative hemorrhage
Incisional hernia
Respiratory complications
Anesthesia accidents
Separation of suture line
Gastrojejunal invagination
Mortality

Postoperative Vomiting.—Many cases of postoperative vomiting occurred. All but 2 yielded to such measures as time, lavage, frequent small feedings, proteinization. In the first of these there was a case of obstruction of the efferent loop with reflex into the afferent, which yielded to jejunojejunostomy. In the second, the roentgenograms showed retention in the gastric stump. At operation, adhesion between the posterior surface of the mesocolon and the efferent loop was disclosed. The difficulty was apparently relieved by liberation of these adhesions. For two days after the operation, evidences of obstruction disappeared. However, the vomiting returned and persisted more or less for five or six months, finally disappearing, ending in ultimate recovery. Proteinization was constantly attended to, although at no time in the course was the serum protein level materially reduced.

The author reports that postoperative complications (including the "vicious circle") have markedly diminished after routine employment of the short loop technic. He also refers to the modification of the Polya gastrectomy proposed by U. G. Dailey, in which the stoma is placed on the middle third of the gastric stump instead of at either extremity, resulting in a funnel-like exit and tending to prevent pouching in the stomach remnant.

The "dumping syndrome" has been met with in about 10 per cent of the cases. It is discussed with especial reference to the size of the stoma, in accordance with the original concept of Charles Mix Louis of the John B. Murphy Clinic and E. Wyllis Andrews (Mercy Hospital, Chicago). The biochemical and neural implications are not referred to.

Duodenal Fistula.—There were 3 cases of this complication in the series. The author discusses the causes and management of this grave condition. Suction by means of an inserted Nelaton catheter, as recommended by Priestley, and strict attention to protein and electrolyte values constitute the essential therapeutic measure.

Internal Hernia.—One of the gastrectomized patients returned after seven months of comparative well-being, in grave shock after a drinking bout. He died during the night of his admission. Autopsy disclosed a herniated mass of small intestine between the anterior surface of the stomach and the superior border of the colon, with strangulation.

Injury to the Common Duct.—This lesion occurs in difficult dissections in which the ulcer and its collateral edema occupy a position near the common duct. The author's only case, recognized immediately, yielded to suture and T-tube drainage.

Bancroft's technic of reaming out the pylorus without attempting complete removal of the latter, is considered by the author, in agreement with general surgical opinion, a wise precaution against choledochus injury in certain instances.

Postoperative Hemorrhage.—Massive gastroduodenal intraluminal hemorrhage was discovered unexpectedly at autopsy in 1 of the cases of postoperative deaths. The precise point of bleeding was not determined, and details are omitted as to this. The patient died on the third day.

Incisional Hernia.—The only case occurred in connection with a transverse incision, which is rarely used in this clinic.

Respiratory Complications.—There was 1 death from postoperative pneumonia, [illegible]firmed by postmortem examination. No respiratory complications a[illegible]orted.

Anesthesia Accidents.—One patient died fourteen hours after a gastrectomy lasting two and one-half hours, under drop ether, from which he never awoke. Permission for autopsy could not be obtained.

Another suffered cardiac arrest under spinal anesthesia. The abdomen had already been opened. Cardiac massage and administration of oxygen restored cardiac action, and the operation was completed without further incident, ample inhalations of oxygen being given throughout the procedure.

Wound Separations.—The only cases occurred in an earlier period of the history of the clinic.

Gastrojejunal Invagination.—A man 40 years of age died on the day of admission, with gross vomiting of blood and a palpable mass in the epigastrium. At autopsy a loop of necrosed jejunum was observed, invaginated into the stomach. This complication is rare. The author cites the publications of von Steuben (Germany), Otero (Journal de Chirurgie, Paris 1938), Sibley (Proceedings of Mayo Clinic) and Adams (British Medical Journal, 1933) on the subject.

Mortality.—Eleven deaths occurred during hospitalization. Three patients died of peritonitis—1 after separation of the suture line at the upper angle of the anastomosis; 1 from necrosis of the gastric stump after excision of a duodenal ulcer and a diverticulum, and 1 from a duodenal fistula that ended up with multiple abscesses of the liver, with rupture and peritonitis.

One died of postoperative hemorrhage. The death of another was the anesthesia death, both previously alluded to.

One death was considered due to overhydration with parenteral fluids.

In 2 cases, in the absence of autopsy, the cause was not determined.

A mortality percentage of 6.17 is not considered excessive in view of the late stages of the disease and the miserable physical status of many of the candidates for operation.

Megacolon, by Dr. Charles St.-Cyr (Martinique). Three cases are reported, in 2 of which the patients were children aged 7 and 9 years respectively, and 1 a 63-year-old man. Colectomy and ileosigmoidoscopy in one stage was done without mortality, and with excellent results.

The inconsistent results following sympathectomy are referred to. An operation consisting of "pull-through" of the rectosigmoid and rectocolic anastomosis, recently described by Chalnot and Benchoux, is mentioned. The rationale of this operation rests upon the fact that the sigmoid, containing no cells of Auerbach's plexus, is extirpated. The author has had no experience with the latter procedure and concludes that colectomy is the best method of surgical treatment of megacolon.

Thoracotomy and Pulmonary Exeresis, by Dr. A. Denize. The author discusses the rapidly increasing importance of thoracic surgery, the mounting frequency of pulmonary cancer, and the impending standardization of cardiac surgery. Personal experiences related principally to the surgical treatment of pulmonary tuberculosis and the indications and technic for thoracotomy are elaborated.

Glaucoma in Haiti, by Dr. Georges Hudicourt. This scholarly discussion of glaucoma by Professor Hudicourt and the article of Dr. Camille Tirolien on elephantiasis will be reviewed in full in a later issue.

Owing to its highly technical character and its special importance in tropical medicine, the article **The Relative Value of Cyto and Serodiagnosis in Subtropical Yaws, by Drs. Francois Duvalier and Aurele A. Joseph** should be read in the original, reprints of which may be obtained from the authors in Port-au-Prince.

Maternal and Infantile Protection in Martinique, by Dr. Hermann Perronnette. Dr. Perronnette describes interestingly the measures that have been put into execution as Public Health Ordonnances under the French government and its overseas departments, since the termination of the first World War (Ordonnance of Nov. 2, 1945).

Introduction to the Medical Climatology of the Antilles, by Dr. Camille Petit. This is an excellent exposé of the broad subject of climatology and its bearing on medical problems and human welfare in the Antilles. The following resumé concludes the article:

"Recent evolution of the patholoigy of infection points up the increasing necessity for the study of the physiopathologic action of tropical climates on the human organism.

"This chapter of medicine requires new *clinical and experimental investigation*, done preferably by the physicians in the given region, for example, the Antilles."

The investigations referred to by Dr. Petit will be concerned with the study of factors still little known, especially the influence of heat and humidity.

Study of Certain Particular Effects of Alcoholic Intoxication in Martinique, by Dr. Camille Petit.

Problems of Nutrition in the Antilles and French Guiana, by Dr. Etienne Montestruc Director, Institute Pasteur (Martinique). These two articles together form a comprehensive exposé of the problems of eating and drinking as related to the Antilles. Both are worthy of special study.

Clinical obstetrical experiences are reported in the next four papers:

Delivery by Ocytocis Associated with Demerol or Pathidine, by Drs. Armand, Boucicaut and Lafontant.

Abdominal Pregnancy at Term, by Drs. Marc Augustin, St. Lucien Hector and Muriel Benedict.

Retroperitoneal Abdomino-pelvic Hemorrhage During Pregnancy, by Drs. Maurice Armand and Raymond Borno.

One Year's Experience with Therapy Tissulaire at the Maternite de Chancerelles, by Drs. Maurice Armand, Louis Mathieu and Marcel Petion (Haiti). The last mentioned article relates experience in the treatment of menstrual and allegiohormonal disturbances by the use of tissue grafts—placental and amniotic membrane, applied subcutaneously. Interesting results are reported.

Sacral Sympathectomy in the Treatment of Dysmenorrhea, by Dr. Scherer Adrien. This article reports *favorable* results in the treatment of dysmenorrhea by the operation of Cotte. The patients were mostly of the working classes.

Concerning a Method of Treatment of Dysmenorrhea, by Dr. Yvonne G. Sylvain. Mlle Sylvain reports a high percentage of satisfactory results with the employment of depotestosterone (Upjohn) in the treatment of primary dysmenorrhea.

Cancer of the Uterus in the Antilles, by Drs. Aliker and Mayrac. The authors allude to the paucity of replies from practicing surgeons to questionnaires seeking data on the frequency of cancer of the uterus. The data supplied by the Pasteur Institutes of Martinique, Gaudeloupe and Guiana, and by Dr. Pierre-Louis from Haiti, permit a compilation of cases. Referring to the hypothesis that native Africans have a special resistance to cancer, the authors note a marked divergence of opinion among observers. Cazalis De Pury practiced in Africa for thirty years without encountering a single case of cancer. Numerous other French writers lean to the opinion that cancer is rare among aborigines. Cazanove, student of carcinomatology in the French Colonies is quoted as follows with reference to cancer among African people:

"Senegal (Africa), average percentage of admissions of patients with cancer: 1.19 per cent.

Mauritania: None in two years.

Soudan: 'Very rare.'

Upper Volta: None in two years.

Guinea: None.

Ivory Coast (Africa): Two cases in one year.

Dahomey: 14 cases in one year, 15,000 consultants."

These figures date back several years.

Current figures agree in deciding that cancer is increasingly recognized, and that author states his adherence to the theory that it is the mode of living, rather than the racial factor *per se*, that conditions the frequency of the disease.

The author discusses in detail the well-known technics of diagnosis and treatment. His conclusions are as follows:

1. Genital cancer, especially of the uterus, is frequent in the Antilles.
2. It affects the different races equally.
3. In general, the diagnosis is too long delayed.
4. Systematic and complete gynecologic examination is needed in the presence of crytogenetic leucorrhea and unexplained bleeding.
5. Frequent employment of the Schiller test is strongly advised.
6. *Surgical biopsy of any doubtful lesion* should be insisted upon.
7. In all cases, even those in which operation is apparently successful, supplementary radiotherapy should be given.

The last 40 pages of the Bulletin are devoted to a discussion of tuberculosis. Unfortunately, space will not permit a review of this interesting symposium which includes the following presentations:

The Fight Against Tuberculosis in Haiti, by Dr. Louis Roy.

Five Years of Apicolysis with Plombage in Haiti, by Drs. F. H. Jaeger, J. A. Guignard and A. Denize.

Pregnancy and Tuberculosis, by Dr. Maurice Selbonne.

The Bronchoscope in Pulmonary Tuberculosis, by Drs. G. Simpson and Desir. (This article is accompanied by reproduction of a large number of interesting thoracic roentgenograms.)

Balance Sheet on Antituberculosis Vaccination in Haiti, by Dr. Turgot Cintellus.

The Utilization of B.C.G. in Glycerin in the Investigation of Bacillary Allergy in Fresh Subjects, by Dr. Etienne Montestruc.

Two thousand years back, at the dawn of medicine, began the doctrine of the 'humours.' It has always been a fascinating pursuit to divide human beings into different groups and categories. The Greek physicians did it, and modern psychologists have followed them. The most ancient and long enduring of these classifications of mankind was based upon the humours. These humours were the basis of man's understanding of his own organization. They were bodily forces supposed to influence health and temperament, four of them in number, the blood, phlegm, yellow bile and black bile, and it was believed that particular types of people were specially charged with excess of one or other humour. Thus, stout and optimistic people were 'sanguine' because they were supposed to have an excessive amount of *sanguis* or blood, and this meaning has been preserved in our modern use of the word. Gloomy and nervous people were hypochondriacal and believed to suffer from too much black bile which is the secretion of the liver, and indeed the word hypochondriacal means literally 'under the ribs.' Phlegmatic people had too much phlegm, and so on.

This idea of linking a person's illness and temperament with one of the body fluids hung over medical thought right until the nineteenth century. We shall see in a later chapter of this book how a celebrated professor at Berlin, Rudolf Virchow, opposed this conception, and made body cells the foundation of health and disease. The idea of the humours was ridiculed by Virchow and his pupils all over Europe. But Brown-Séquard revived it. In place of these imaginary humours which the Greeks and the Arabians loved but which were nothing but fantastic conceptions of the human mind, he substituted the 'endocrines,' that is the 'internal secretions' of organs such as the adrenals.

—*Williams*

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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The Journal of the
International College of Surgeons

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Vol. XXIII MARCH, 1955 No. 3

Original Articles

Peripheral Arteriosclerosis

Observations Relating to Surgical Treatment

H. P. TOTTEN, M.D., M.Sc. (Surg.), F.I.C.S.*

INGLEWOOD, CALIFORNIA

THE problem of conservative surgical treatment of peripheral arteriosclerosis resolves itself essentially into a consideration of factors that initiate thrombosis in the arteries of the lower extremity and the measures that may be undertaken to obviate these factors.

The disastrous sequelae incident to thrombotic occlusion of major arteries below the level of the knee and of vital bridging collaterals at any level are frequently responsible for major amputations.

The atheroma may be considered the most important pathologic component, as it not only contributes to reduction of the size of the arterial lumen but is the focal point from which the thrombus usually originates.

Vasospasm is an additional factor that may contribute to peripheral thrombosis through reduction of blood flow in collateral vessels, while [illegible] may be an acceler[illegible]

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From the Department of Surgery, College of Medical Evangelists.

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Sept. 24, 1954.

ease through the initiation of thrombosis.

Restoration of continuity of blood flow in occluded arteries below the popliteal by direct surgical intervention is not practical when such occlusion is due to arteriosclerosis. Furthermore, experience indicates that sympathectomy usually gives disappointing results when major arteries of the leg are obstructed.

Wylie and McGuiness[1] have suggested that arterial stenosis of sufficient degree to cause symptoms is a lesion predisposing to the development of arterial thrombosis.

In my own opinion, stenosis or occlusion of large vessels favors secondary thrombosis of arteries below the level of the knee.

Early diagnosis is considered fundamentally important, and definitive surgery in the form of sympathectomy or direct operation should be undertaken at an early date.

The circumstances of a compensating collateral circulation minimizes subjective abnormalities and largely precludes an early diagnosis unless the history and the physical examination, which should include a careful study of the lower extremi-

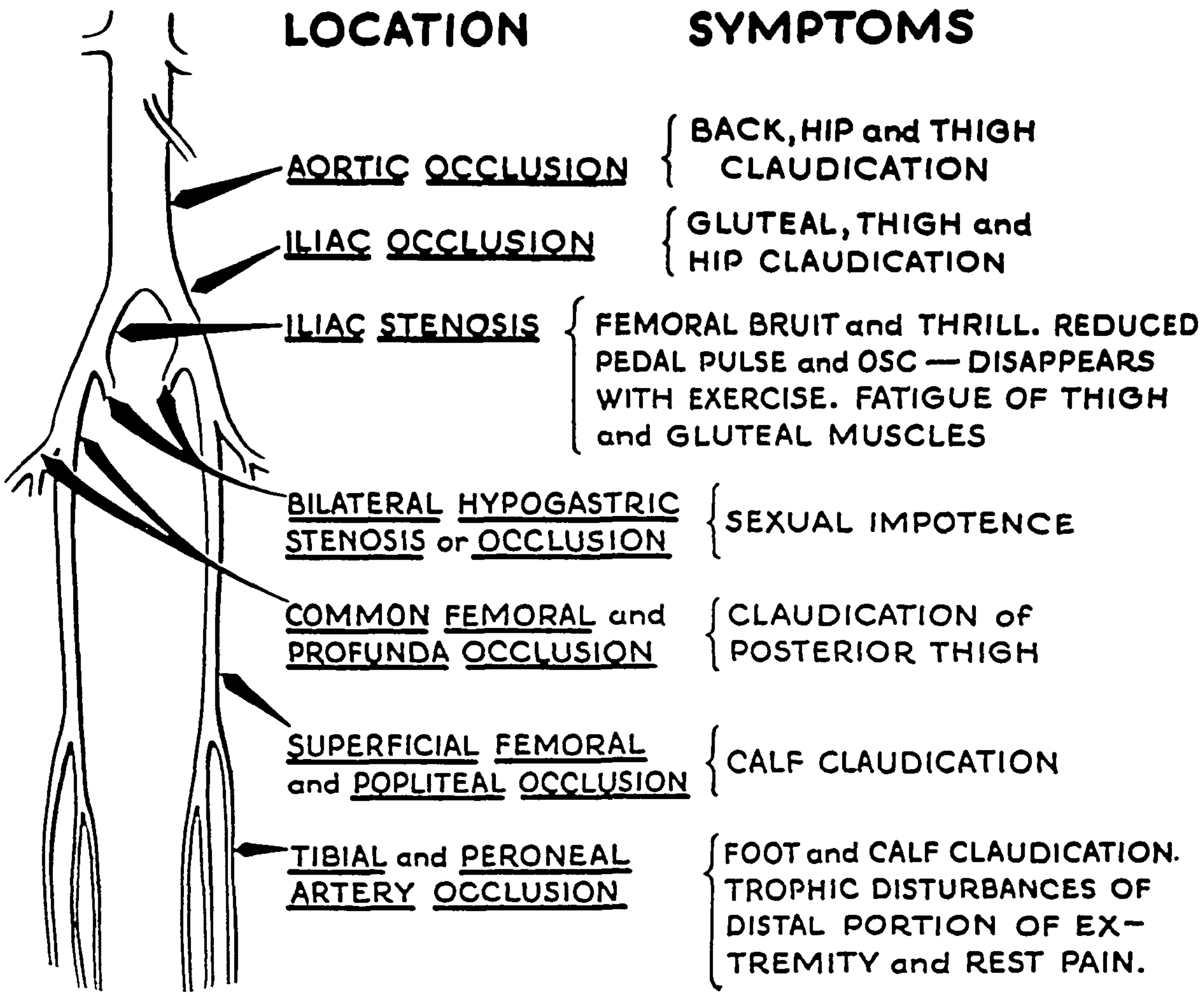
LOCATION
SYMPTOMS
AORTIC OCCLUSION
BACK, HIP and THIGH CLAUDICATION
ILIAC OCCLUSION
GLUTEAL, THIGH and HIP CLAUDICATION
ILIAC STENOSIS
FEMORAL BRUIT and THRILL. REDUCED PEDAL PULSE and OSC — DISAPPEARS WITH EXERCISE. FATIGUE OF THIGH and GLUTEAL MUSCLES
BILATERAL HYPOGASTRIC STENOSIS or OCCLUSION
SEXUAL IMPOTENCE
COMMON FEMORAL and PROFUNDA OCCLUSION
CLAUDICATION of POSTERIOR THIGH
SUPERFICIAL FEMORAL and POPLITEAL OCCLUSION
CALF CLAUDICATION
TIBIAL and PERONEAL ARTERY OCCLUSION
FOOT and CALF CLAUDICATION. TROPHIC DISTURBANCES OF DISTAL PORTION OF EXTREMITY and REST PAIN.

Fig. 1.—Symptoms and physical signs incident to stenosis or occlusion at various levels.

ties, indicate the presence of the condition.

Claudication is the symptom that most frequently causes the patient to seek medical aid. Claudication as it occurs in the calf muscles in the presence of thrombosis of the superficial femoral or the popliteal artery is generally recognized; this symptom, however, when manifested in locations other than the calf, is often mistaken for a symptom of some other condition.

The specificity of this clinical manifestation in various locations, as shown in the diagram (Fig. 1), must be recognized as indicating muscle ischemia, its location designating the muscle group involved and in a general way the level of arterial occlusion.

Narrowing of an artery from incomplete obstruction will produce a murmur. It is systolic and may be accompanied by a thrill.

Examination of the arteries of the lower extremity should include the abdominal aorta, which may be palpated at the level of the umbilicus or higher.

When thrombotic occlusion approaches the level of the renal arteries, pulsation may or may not be obtained, depending upon the habitus of the patient and the degree of transmitted pulsation.

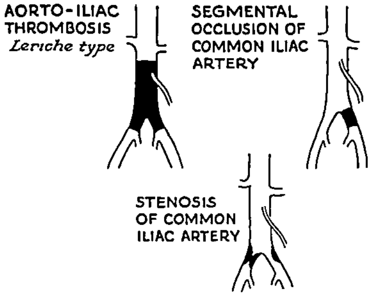
AORTO-ILIAC THROMBOSIS
Leriche type
SEGMENTAL OCCLUSION OF COMMON ILIAC ARTERY
STENOSIS OF COMMON ILIAC ARTERY

Fig. 2.—Types of high occlusion.

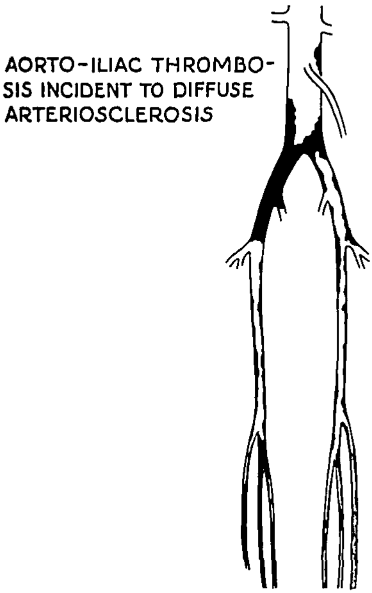

Fig. 3.—A fourth type of high occlusion

The aorta may give a transmitted pulsation for a considerable distance through an obstructed segment. A thrill and bruit may be detected over its course as the result of dilatation, narrowing or thrombotic obliteration approaching a major branch.

The oscillometer is used as an adjunct to physical examination. It facilitates an early diagnosis of incomplete occlusion and is of considerable value in recording progress of the disease and response to treatment.

Arteriographic Study.—Arteriographic investigation may be considered mandatory when direct operation is to be performed. It will answer precisely three fundamental questions, those pertaining

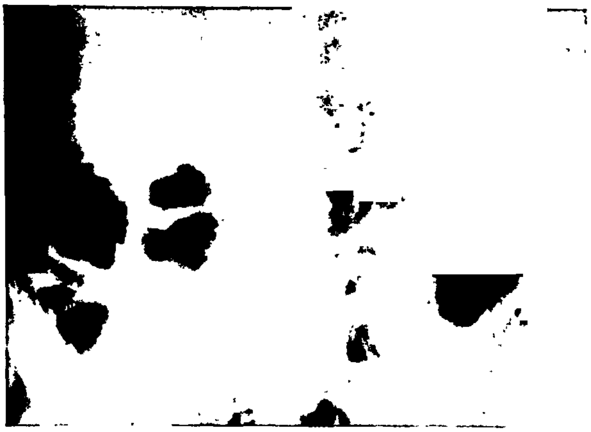

Fig. 4.—Aorto-iliac thrombosis, Leriche type. The aorta is narrow, stenotic, irregular and poorly filled, with complete occlusion at the level of the upper portion of the third lumbar vertebra. At operation it was observed that the thrombus extended almost to the renal arteries. (*Angiology*, October 1954. Reprinted by permission.)

(1) the location and extent of the occlusion; (2) the condition of the distal arteries, and (3) the pattern of the collateral circulation.

The technic of translumbar arteriographic study that I have used is essentially that described by Smith, Rush and Evans,[2] with slight modification. Pentothal is employed, with the patient in the prone position and a pillow beneath the lower part of the chest and the upper part of the abdomen. A point is selected approximately 8 cm. to the left of the midline and immediately below the lowest rib.

A No. 18 gauge 15 cm. needle is inserted in a medial, ventral and sharply cephalad direction until it strikes the vertebral body. The needle is then withdrawn a few centimeters and inserted in a more ventral direction until it passes over the anterior surface of the vertebral body and into the aorta. The resistance encountered when the needle impinges on the aorta and the sudden release as it enters the lumen of the vessel are distinctly felt. A venotube is used as a connector between a 20 cc. syringe and the needle. This keeps the syringe well out of the roentgenographic field and at the same time obviates the possibility of inadvertently displacing the needle from its position in the aorta.

After an intradermal sensitivity test, 20 cc. of 70 per cent Diodrast or Urokon is injected. Approximately ten seconds should be allowed for the first 10 cc. of contrast medium, in order to fill collateral vessels. The remainder is injected rapidly, with exposure of the film as the injection is completed.

Adequate concentration may require the use of two needles for rapid simultaneous injection of a total of 20 to 25 cc. of the contrast medium.

Retrograde femoral arteriographic study enables one to determine the exact point of termination of high segmental block, while distal femoral arteriographic study enables one to visualize the arteries of the thigh and leg.

Types of High Occlusion.—These may be conveniently divided into four groups (Figs. 2 and 3).

I. Aorto-iliac Thrombosis, Leriche Type[3] (Figs. 4, 5 and 6):

This type occurs in comparatively young adults, usually male, under 55 years of age. The arteriographic signs are sharply segmental occlusion and normal distal vessels. Clinically the subjective abnormalities are as follows:

1. Sexual impotence
2. Extreme liability to fatigue of both lower limbs
3. Claudication in the lower portion of the back and thighs.
4. Constant coldness of the lower limbs.
5. Rest pain of severe degree (a late symptom only).

The objective findings are:

1. Global atrophy of both lower extremities.
2. Absence of trophic changes in skin.
3. Absence of arterial pulsations of the lower extremities.
4. An oscillometric index that is char-

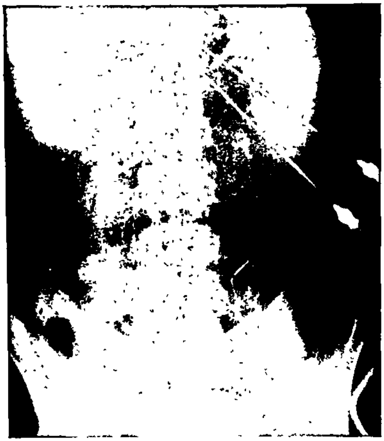

Fig. 5.—Aorto-iliac thrombosis, Leriche type. There is complete occlusion to the level of the third lumbar vertebra, with partial occlusion extending to the renal arteries. The inferior mesenteric artery is poorly defined.

acteristically zero at all levels and pressures.

The course of the condition is progressive but variable in rapidity.

Conservative surgical treatment consists of:

1. Sympathectomy (preliminary and as an adjunct).
2. Direct operation by (a) Resection and replacement and (b) thromboendarterectomy.

II. *Aorto-iliac Thrombosis Incident to Diffuse Arteriosclerosis* (Figs. 7, 8, 9 and 10): The highest incidence is in persons over 60 years of age, usually men. The arteriographic signs are as follows:

1. Segmental occlusion, present but not sharply defined.
2. Diffuse involvement of distal vessels.
3. Usually involvement of major vessels below the knee.

The clinical features are (1) generalized arteriosclerosis, with cerebral, cardiac and renal disease frequently present; (2) rest pain (a common complaint); (3) trophic changes in the distal portion of the extremity, and (4) constant or dependent rubor (usually present in some degree).

The course is progressive, and acute arterial thrombosis is not uncommon. Death may occur from visceral complications before ischemia of the extremity requires amputation.

Fig. 6.—Aorto-iliac thrombosis, Leriche type. Partial occlusion of the aorta, starting at the level of the first lumbar vertebra, with complete obstruction at the bifurcation. Segmental occlusion of the right common and external iliac arteries is present, with partial filling. The greater part of the right external and internal iliac arteries is not visualized. The left common iliac artery is dilated, with poor concentration of the opaque medium, indicating pa[illegible] inferior mesenteric artery is [illegible] *giology*, October 1954. R[illegible]

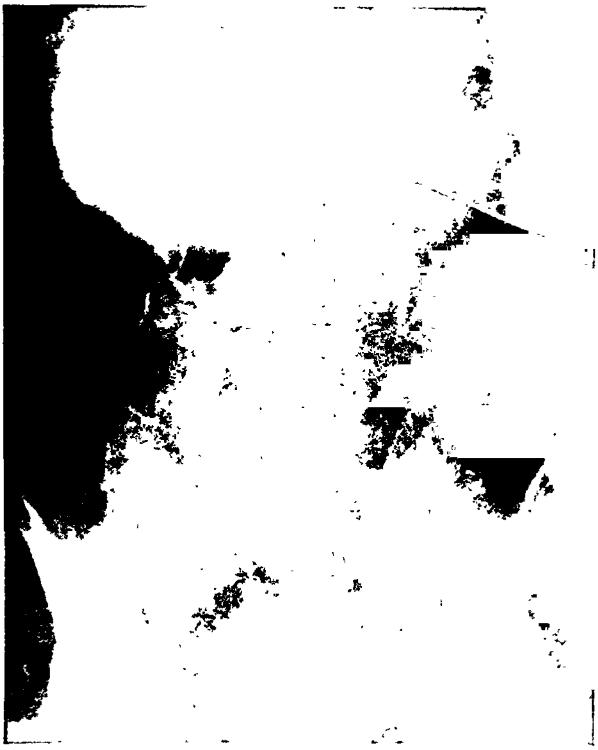

Fig. 7.—Aorto-iliac thrombosis incident to diffuse arteriosclerosis. The aorta is poorly visualized and partly obstructed, with complete occlusion at the lower border of the second lumbar vertebra. The opaque medium is well concentrated in the inferior mesenteric artery. Numerous smaller collateral vessels are visible, including the spermatics.

Conservative surgical treatment consists of sympathectomy, a palliative procedure that may reduce the hazard of amputation.

III. *Segmental Occlusion (Complete) of Iliac Artery* (Figs. 11 and 12) : The arteriographic signs are as follows:

1. Segmental obstruction, common iliac artery.
2. Patent distal vessels.

Clinically:

1. Claudication of thigh or thigh and hip.
2. Reduced peripheral pulses and oscillometric index as compared with those of the contralateral extremity.
3. Absence of trophic disturbances in the distal portion of the extremity.
4. Absence of rest pain.

Conservative surgical treatment consists of sympathectomy and thromboendarterectomy.

IV. *Partial Occlusion of the Common Iliac Artery:* The arteriographic evidence is incomplete occlusion of the common iliac artery (Fig. 13). The clinical features are as follows:

1. Claudication often begins in the calf, with radiation to the thigh, hip or buttock.[4]
2. The peripheral pulses are palpable but reduced in volume.
3. The oscillometric index reduced as compared with that of the contralateral extremity.
4. A systolic bruit may be heard over the artery.
5. Exercise of the involved leg may cause pedal pulses to disappear.[4]

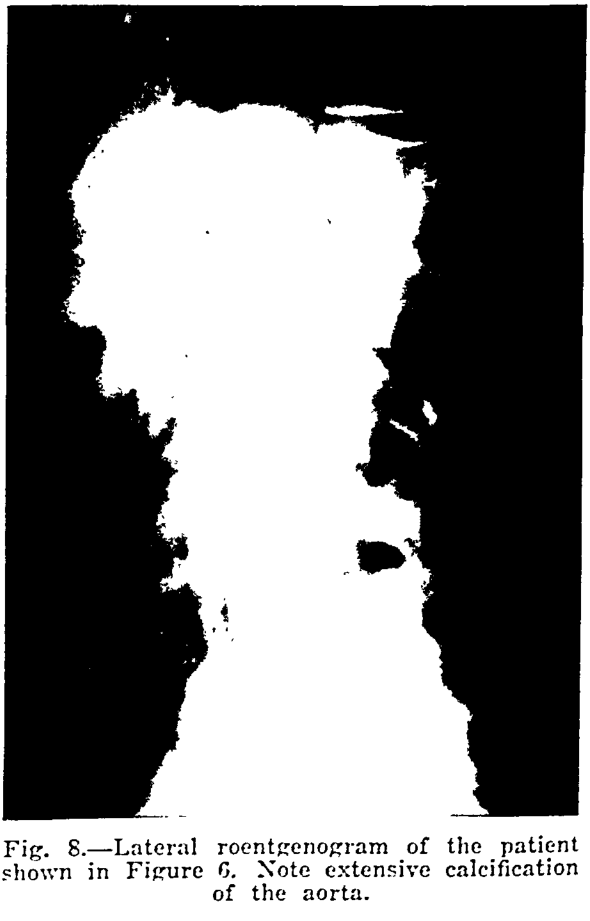

Fig. 8.—Lateral roentgenogram of the patient shown in Figure 6. Note extensive calcification of the aorta.

6. Localized muscle atrophy, rather than global atrophy, is present.

Conservative surgical treatment consists of sympathectomy and thromboendarterectomy.

Indications for Conservative Surgical Procedures.—1. *Sympathectomy:*

The essential effect of sympathectomy is an increase in collateral blood flow. A patient with a well developed collateral circulation or possessing the potential for it is the best candidate for this procedure.

An extremity in which there is no persistent rubor, rest pain or trophic changes of the skin should give a satisfactory response to sympathectomy.

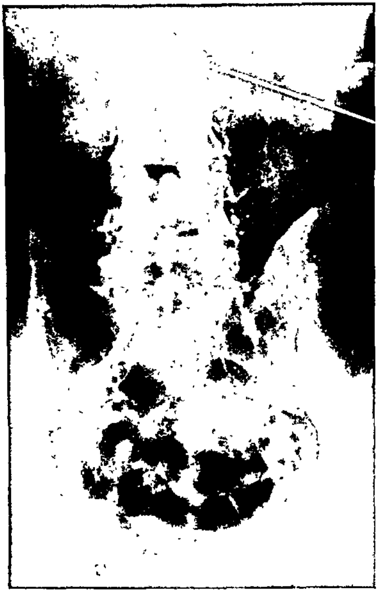

Fig. 9.—Aorto-iliac thrombosis incident to diffuse arteriosclerosis. The aorta is rather tortuous, irregular and poorly filled. The right common iliac artery is tortuous and partially constructed, with poor concentration of diodrast. The left iliac arteries are partly obstructed in several areas.

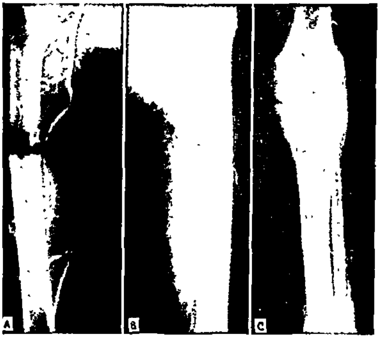

Fig. 10.—Aorto-iliac thrombosis incident to diffuse arteriosclerosis. *A*, right femoral arteriogram. The superficial femoral artery is not visualized except in the lower portion of Hunter's canal. The profunda femoris is well demonstrated and shows anastomosis with a vital bridging collateral of the superficial femoral artery. Supplementary collaterals are fairly numerous, and some hypervascularization is present. Because of the generalized nature of the pathologic process and the comparative adequacy of collaterals, sympathectomy is the procedure of first choice. If subsequent extension of the thrombotic process involves vital collaterals, direct operation (thrombo-endarterectomy or vein graft) will be performed. *B* and *C*, left femoral arteriograms. The femoral arteries are not visualized. Numerous fine supplementary collaterals are demonstrable. A small bridging collateral communicates with the upper portion of the popliteal artery. The vessels of the leg, including the popliteal, are greatly reduced in caliber. Patients with this type of disease are not well suited to direct surgical approach, as the presence of diffuse peripheral arteriosclerosis below the segmental obstruction, especially below the knee, obviates to a great extent the benefit of restoration of blood flow at the femoral iliac or the aortic level.

Preoperative evaluation may be confirmed by response to lumbar sympathetic block or to the Landis-Gibbon reflex heat test, although in my opinion a negative response to lumbar block is not a contraindication to sympathectomy.

Sympathectomy has a place in the treatment of aorto-iliac occlusion as an adjunct or preliminary to direct operation, in order to obviate vasospasm and duce t incidence of peripheral thrombosis.

In cases not suitable for direct operation sympathectomy should be utilized as a definitive procedure to increase the circulatory reserve through the development of collaterals over a long period.

In order to denervate collaterals involved in aorto-iliac obstruction, excision must include lower thoracic as well as lumbar ganglia. To accomplish this, the incision should extend over the twelfth rib to the lateral border of the rectus muscle. The rib is resected when necessary to facilitate exposure of the lower thoracic chain.

A factor of considerable importance in deciding which type of conservative operation is to be used is the pattern of collateral circulation. This applies especially to segmental occlusion below the bifurcation of the common femoral artery.

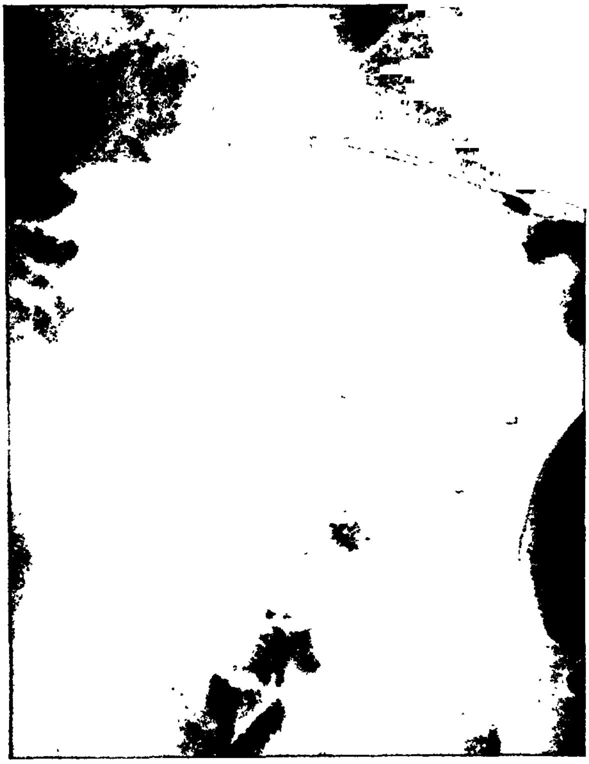

Fig. 11.—Segmental occlusion of left common iliac artery at the aortic bifurcation. The aorta is narrowed at the level of the upper border of the third lumbar vertebra. (*Angiology*, October 1954. Reprinted by permission.)

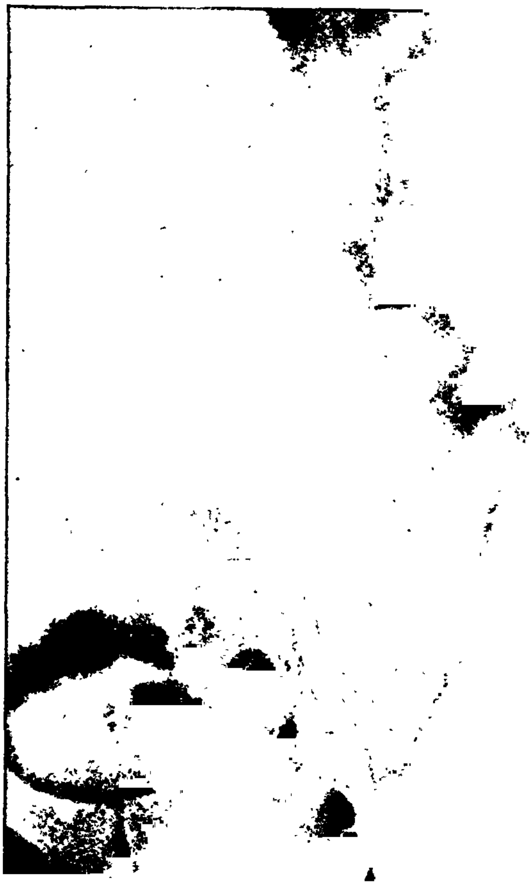

Fig. 12.—Segmental occlusion of the left common iliac artery. Retrograde left femoral arteriogram shows iliac arteries of good caliber, filling normally to the point of obstruction, which is somewhat above the common iliac bifurcation. Numerous collateral branches are visible. (*Angiology*, October 1954. Reprinted by permission.)

Immediately adjacent bridging collaterals should not be lightly sacrificed. With a good collateral potential, sympathectomy may be all that is required.

It has been my observation that sympathectomy performed early in cases of occlusive arterial disease not infrequently increases the distal blood flow to an appreciable degree, as is manifested by a return of previously absent pedal pulses and an increase in the oscillometric index.

In view of these observations, it is my

conclusion that, in a leg sympathectomized early in the course of occlusive arterial disease, a more nearly adequate circulatory reserve will develop, thus decreasing the tendency toward thrombotic occlusion of the arteries in the distal portion of the extremity.

Direct Operation.—It is fairly well established that direct operation for segmental occlusion, in the form of resection and replacement or thromboendarterectomy, is quite satisfactory in selected cases and that such procedures may be performed for obstruction to the arterial supply of the lower extremity from the renal artery level in the aorta to the bifurcation of the popliteal artery, provided (a) that the integrity of the tibial and peroneal arteries is maintained, (b) that the general condition of the patient justifies the procedure and (c) that there are no advanced trophic changes in the distal portion of the extremity.[5]

High obstruction, as exemplified by aorto-iliac thrombosis, is probably best adapted to direct surgical attack, because the large size of the arteries increases the incidence of long term patency; because the procedure is more urgently indicated in view of the inadequacy of collaterals in this location, and because in a definite percentage of cases the progressive character of the process tends toward a fatal termination.

Thromboendarterectomy has proved to be an effective means of direct operation when the arterial wall is suitable for this procedure. Resection and replacement, by means of homologous artery, autogenous vein or prosthesis, however, may at times be the only practical method of direct surgical intervention.

Thromboendarterectomy may be selected as the procedure of choice when the following conditions are present:

1. Symptomatic stenosis of the aortic or iliac region. Early operation is particularly indicated in these cases, as incomplete occlusion is the forerunner of thrombosis.
2. Aorto-iliac thrombosis extending to the renal artery level, at which site the arterial wall, because of athermatous changes, possess a degree of friability that tends to make resection at this level hazardous.
3. Segmental occlusion of one or both common iliac arteries.
4. Segmental occlusion involving both the external iliac and the femoral arteries. Under these circumstances endarterectomy disobliterates important branches, including the profunda femoris as well as the main arterial pathway.

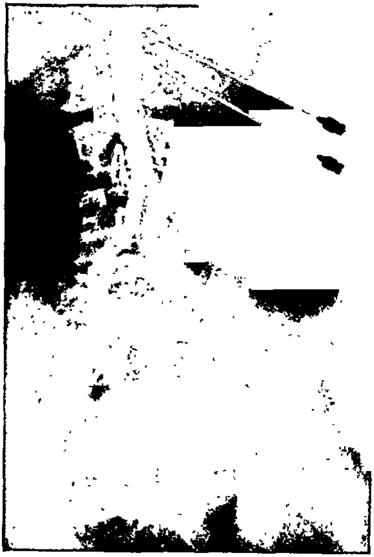

Fig. 13.—Stenosis of the left common iliac artery. The aortogram shows incomplete occlusion of the entire left common iliac artery. The operation performed in this case was sympathectomy and thromboendarterectomy in a one-stage procedure, by an oblique retroperitoneal approach.

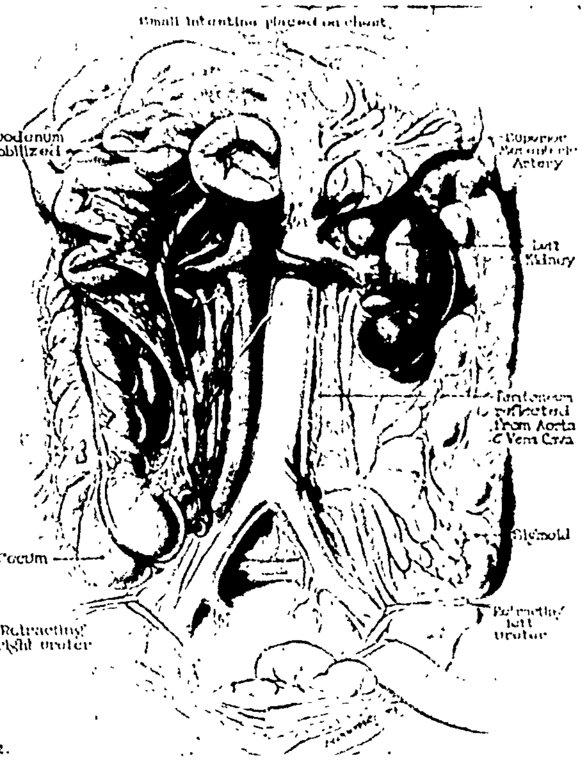

Fig. 14.—Surgical anatomic drawing of aorto-iliac area.

Technic.—Certain technical considerations related to thromboendarterectomy may be mentioned:

Exposure for extensive aorto-iliac thrombosis (Figs. 14 and 15): A long midline incision, extending from the symphysis to the xyphoid, is utilized for exposure of the aorta to the renal artery level. The small intestine, previously decompressed by use of a Harris tube, is displaced from the peritoneal cavity and surrounded by warm moist packs or placed in a Lahey bag. After incision of the posterior parietal peritoneum overlying the aorta, the duodenum is mobilized and displaced upward. The left renal vein is then carefully exposed and retracted upward or downward, and both renal arteries are dissected for a short distance.

This extensive exposure is required, when the thrombotic process has extended to the renal artery level, in order to allow placement of a traction tape above the renal arteries for temporary hemostasis while the aorta is reamed out above the upper limit of the incision. A Southwick or Blalock clamp is then applied immediately below the renal arteries, and the tourniquet clamp is released but left in place.

Exposure for unilateral iliac artery occlusion: A long oblique extraperitoneal incision is advantageous, as it gives adequate exposure for both sympathectomy and thromboendarterectomy.

Exposure for external iliac and femoral artery occlusion: Here an incision overlying the femoral artery is extended obliquely above the inguinal ligament in an extraperitoneal fashion.

Combined exposure of the common and superficial femoral and popliteal arteries is obtained by keeping the entire extremity mobile. The incision overlies the femoral artery in Scarpa's triangle and Hunter's canal and may be extended transversely across the popliteal space. The lower portion of the femoral and the popliteal artery are exposed by cutting the adductor magnus tendon fibers of the anterior wall of the adductor canal. For further exposure of the popliteal space Barker[6] has suggested dividing the common fibrous attachments of the semimembranous, semitendenosus and gracilis muscles, sparing the gastrocnemius. The exposure in all cases should be generous enough to allow the dissection incident to the disobliteration procedure to be carried well beyond the grossly pathologic tissue into the comparatively normal artery.

Hemostasis: An over-and-over continuous suture of No. 5-0 braided arterial silk suture is used to close the arterial incision. If an attempt is made to effect immediate hemostasis after suturing an endarterectomized artery there is a tendency for each needle puncture to increase the bleeding. It is advisable, therefore, to wait for a short time, as this will enable one to determine the points that will cease

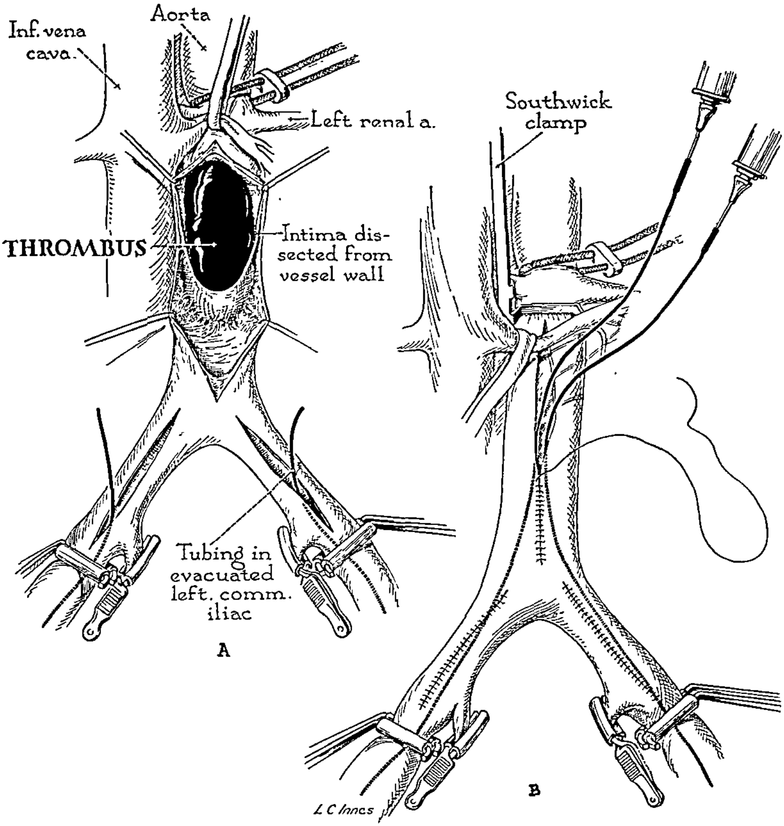
Inf. vena cava
Aorta
Left renal a.
THROMBUS
Intima dissected from vessel wall
Tubing in evacuated left. comm. iliac
A
Southwick clamp
B
L C Innes

Fig. 15.—*A*, aorto-iliac thromboendarterectomy technic, with polyethylene tubing in each iliac artery for instillation of heparin. *B*, aorto-iliac thromboendarterectomy nearing completion. Sutures in common iliac arteries have been placed; aortic incision is being closed.

bleeding spontaneously and those that will require additional sutures. In view of the not infrequent reports of postoperative bleeding and disruption at the suture line, it is perhaps advisable to reinforce the suture lines with gelfoam as a routine measure. In cases in which it is apparent that the arterial wall is weak, additional security is obtained by wrapping the vessel in gelfoam encased in fascia lata.

Use of Anticoagulants: During the operation, especially if it is prolonged, the use of an anticoagulant is important. It has been found advanta to i e

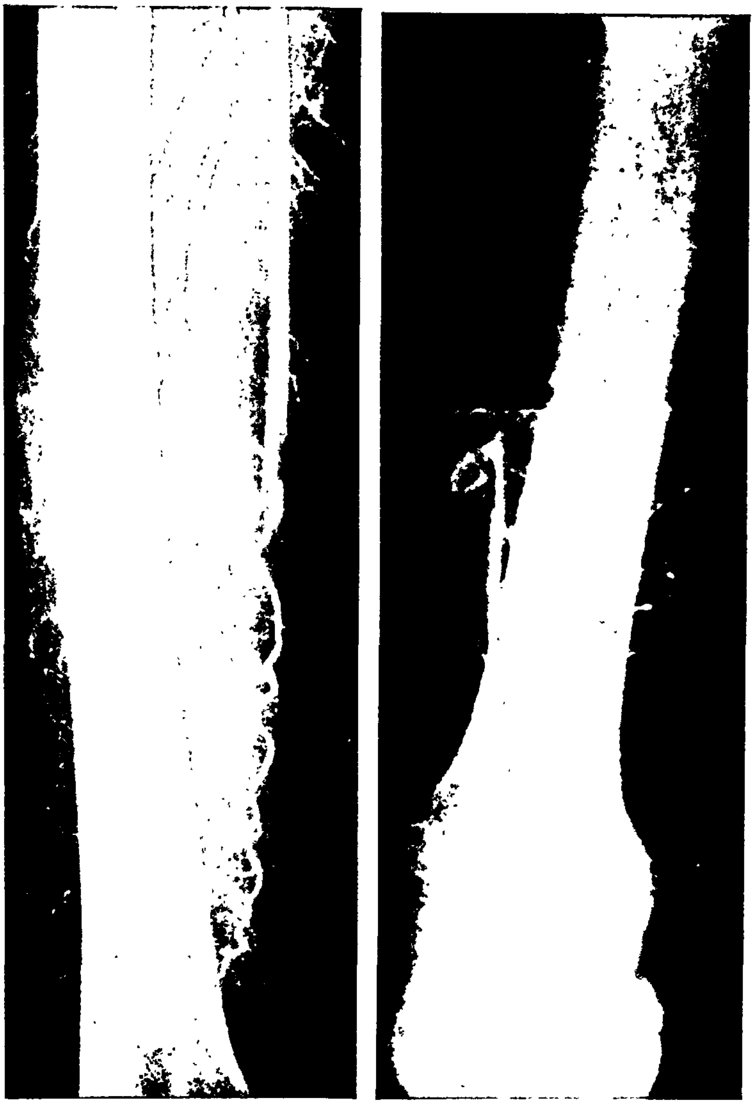

Fig. 16

Left, occlusion of superficial femoral artery in Hunter's canal, due to an atheroma with secondary acute thrombosis producing acute ischemia and threatened gangrene. Note the marked hypervascularization and supplementary collaterals and the absence of adequate bridging collaterals. Sympathectomy and thromboendarterectomy were performed, with complete restoration of circulation.

Right, thrombotic occlusion of superficial femoral artery in Hunter's canal. Note fairly well developed bridging collaterals. Treatment consisted of sympathectomy and thromboendarterectomy with preservation of collaterals.

the artery during closure with heparin, 100 mg., to 500 cc. of dextrose or saline solution by means of polyethylene tubing placed within the arterial lumen. In like manner the solution is instilled into the distal artery at short intervals. An intravenous drip of heparin (200 mg.) to a liter of solution is used during prolonged operations to maintain the Lee-White coagulation time at twenty to thirty minutes.

During the postoperative period one is

confronted with the hazard of arterial and venous thrombosis without the use of an anticoagulant on the one hand and the danger of hemorrhage on the other. In my opinion the safest plan is administration of sodium heparin intramuscularly at intervals of three to four hours, in doses of 25 to 75 mg., according to indications as determined by the Lee-White coagulation time. If bleeding should occur, the effect of heparin may be nullified by protamine. Transfusions should be promptly given when indicated.

Below the bifurcation of the common femoral artery, thromboendarterectomy may be performed in selected cases with excellent results (Figs. 16 and 17).

An end-to-side vein graft without excision, according to the method of Kunlin, or disobliteration at each end of the obstructed segment to preserve the bridging collaterals in conjunction with the graft, may be employed as alternate procedures in those cases in which sympathectomy alone does not suffice.

SUMMARY AND CONCLUSIONS

The author points out that successful conservative procedures for peripheral arteriosclerosis are largely dependent upon the integrity of the arteries below the knee.

Thrombus formation tends to occur at the site of stenosis or partial occlusion of large arteries.

Secondary thrombosis of tibial and peroneal arteries is favored because of stenosis or occlusion at a higher level.

Emphasis is placed upon the importance of early recognition and definitive surgical treatment.

The various syndromes of thrombotic occlusion of large arteries are described.

Preoperative clinical and arteriographic examination will determine with a fair degree of accuracy the collateral blood flow potential of an extremity, upon which the beneficial effect of sympathectomy is largely dependent.

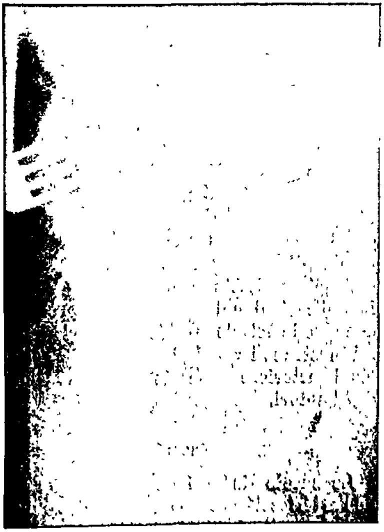

Fig. 17.—Occlusion of superficial femoral artery, with inadequate distal vessels and absence of functioning bridging collaterals. Supplementary collaterals are well demonstrated. Sympathectomy was ineffective and direct operation was not practicable.

The indications for direct operation and the problems incident thereto are discussed.

Arteriograms illustrate the various types and degrees of occlusion encountered.

RIASSUNTO

L'autore mette in rilievo il fatto che i risultati dei vari metodi di terapia incruenta delle vasculopatie periferiche arteriosclerotiche dipendono dall'integrità delle arterie al di sotto del ginocchio. Nelle grosse arterie i trombi tendono ad instaurarsi in corrispondenza dei tratti stenotici o parzialmente occlusi. La tron

bosi secondaria della tibiale e della peronea si verifica più facilmente se in tali arterie esistono tratti stenotici od occlusi a livelli superiori. Si sottolinea l'importanza della diagnosi precoce e della cura chirurgica. Vengono descritte le varie sindromi derivanti dall'occlusione trombotica delle grandi arterie. Gli esami clinici ed arteriografici pre-operatorii danno modo di diterminare l'entità potenziale del circolo collaterale d'un arto, da cui prevalentemente dipendono i risultati favorevoli della simpaticectomia. Vengono discusse le indicazioni chirurgiche ed i problemi con esse in relazione. Alcuni arteriogrammi illustrano i vari tipi e gradi delle occlusioni arteriose capitate all'osservazione degli autori.

RÉSUMÉ

Le succès du traitement conservateur de l'artériosclérose périphérique dépend en grande partie de l'intégrité des artères au-dessus du genou.

On observe une tendance à la formation de thrombus au niveau de la sténose ou de l'occlusion partielle grandes artères.

La thrombose secondaire des artères du tibia ou du péroné est favorisée par la sténose ou l'occlusion à un niveau plus élevé.

L'auteur insiste sur l'importance du diagnostic et du traitement chirurgical précoces. Il décrit les divers syndromes de l'occlusion par thrombose des grandes artères.

Le débit sanguin collatéral d'une extrémité—duquel dépend en grande partie le succès de la sympathectomie, peut être déterminé de façon assez précise par l'examen clinique et artériographique post-opératoire.

Les indications opératoires et les problèmes qu'elles posent sont discutés.

Des artériographies des différentes variétés d'occlusion complètent ce rapport.

ZUSAMMENFASSUNG

Der Verfasser weist darauf hin, dass der Erfolg konservativer Massnahmen bei der Behandlung der peripheren Arteriosklerose in hohe, Masse davon abhängt, ob die Schlagadern unterhalb des Knies in gutem Zustand sind.

Thrombenbildung entwickelt sich mit Vorliebe an der Stelle einer Verengung oder eines teilweisen Verschlusses grosses Schlagadern.

Die Entstehung einer sekundären Thrombose der tibialen und peronealen Arterien wird durch eine Verengung oder einen Verschluss an einer höher gelegenen Stelle begünstigt.

Die Wichtigkeit frühzeitiger Diagnose und genau festgelegter chirurgischer Behandlung wird hervorgehoben.

Die verschiedenen Symptomenkomplexe des thrombotischen Versuchlusses grosser Schlagadern werden beschrieben.

Mit Hilfe klinischer und arteriographischer Untersuchungen vor der Operation lässt sich ziemlich genau bestimmen, welche Möglichkeiten der Entwicklung eines kollateralen Blutkreislaufs, von dem eine günstige Wirkung der Sympathektomie wesentlich abhängt, in einer Extremität vorhanden sind.

Die Indikationen zu unmittelbarer Operation und die damit verbundenen Probleme werden erörtert.

Verschiedene Formen und Ausmasse des arteriellen Verschlusses werden durch Arteriogramme illustriert.

RESUMEN

El autor señala que el éxito de los procedimientos conservadores para el tratamiento de la arterioesclerosis periférica depende en gran parte de la integridad arterial por debajo de la rodilla.

La formación de trombos tiende a producirse en el sitio de estenosis ú oclusión parcial de las grandes arterias.

La trombosis secundaria de las arterias tibial y peroneal es favorecida por estenosis ú oclusiones de niveles superiores.

Se hace notar la importancia del reconocimiento temprano del padecimiento y su tratamiento quirúrgico definitivo.

Se describen los diversos síndromes de oclusión trombósica de las grandes arterias.

El examen clínico así como el arteriografico preoperatorios determinarán con cierto grado de exactitud la circulación colateral potencial de una extremidad, de la que depende el efecto benéfico de la sinpatectomía.

Se comentan las indicaciones para la operación directa y sus problemas inherentes.

Los arteriogramas ilustran los diversos tipos y grados de oclusión.

SUMARIO

O A. salienta que o sucesso dos métodos conservadores no tratamento da arteri oclerose periférica, em grande parte, derende da integridade das artérias abaixo do joelho.

A formação de trombos tende a ocorrer na região de estenose ou oclusão parcial das grandes artérias.

A trombose secundária das artérias tibial e peroneira fica favorecide por estenose ou oclusão em níveis mais altos.

A importância do diagnóstico precose é salientada, bem como do tratamento cirúrgico definitivo.

São descritos os vários síndromes de oclusão trombótica das grandes artérias.

Os exames clínico e arteriográfico pré-operatório determinarão, com relativo grau de acuracidade o fluxe sanguíneo *colateral potencial de uma extremidade, do* qual depende em grande parte o efeito da simpatectomia.

As indicação direta e os problemas correlatos são discutidos.

Arteriogramas ilustram os vários tipos e graus de oclusão encontrados.

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The thoughts that come often unsought and, as it were, drop into the mind are the most valuable of any we have, and therefore should be secured because they seldom return again.

—*Locke*

Whether you be man or woman you will never do anything in this world without courage. It is the greatest quality of the [illegible] next to honor.

A[illegible]

Surgical Treatment of Gliomas of the Brain

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ROCHESTER, MINNESOTA

"THE cerebral gliomas which represent about 42 per cent of all intracranial new growths in a series comprising something over 1,000 examples, have heretofore been generally regarded as hopelessly malignant tumors." Thus wrote Bailey and Cushing[1] in 1926. In spite of their great contributions and those of other workers on this subject, this opinion still is held generally by physicians more than a quarter of a century later. It would appear appropriate to assess the situation as it exists since cessation of World War II,[2] which generally is considered a landmark for the second generation of American neurosurgeons.

Present Study.—The foundation of this paper is a series of consecutive gliomas of the brain observed at the Mayo Clinic from October 1946, to July 1954. The diagnoses were verified at craniotomy and the tumors were radically resected by a single surgeon, myself. In no instance was one of these lesions unidentified at operation only to be discovered at necropsy. None were subjected merely to biopsy, with bony decompression. All were attacked surgically in the hope of relieving increased intracranial pressure and eradicating the tumor.

General Background. — The treatment just mentioned appeared to be reasonable on a physiologic basis. Neurosurgeons long have recognized the twofold problem presented by brain tumors. The obvious problem is the focal effect of the tumor on the brain or its appendages; the second is the diffuse effect of increased intracranial pressure. Ideally the surgeon should strive first to reduce the intracranial pressure to normal and then to eradicate the tumor with minimal neurologic residuals.

If one adheres to this logic, there would appear to be little justification merely to perform biopsy on a glioma without adequate decompression and resection. The taking of a biopsy specimen usually aggravates increased intracranial tension. It has been my observation that the immediate mortality rate in glioblastoma multiforme (astrocytoma Grade 3 or 4) is greater if the lesion is subjected to biopsy without relief of increased intracranial pressure than if a more radical operation is performed.[3]

Dandy,[4] Gardner (cited by Bell and Karnosh[5]) and others[6] occasionally have performed "hemispherectomy" in an effort to eradicate gliomas that already have produced hemiplegia. In most instances, when a glioma produces complete hemiplegia, the lesion has invaded the internal capsule and the basal ganglia[7] (Figs. 1 and 2). This is the mechanism of paralysis. Subcortical or cortical gliomas that are not deep rarely produce hemiplegia; they more often cause monoparesis or hemiparesis without complete paralysis of the opposite side. A glioma at the cortical level rarely produces hemiplegia. French[6] recently has performed "hemispherectomy" on 7 patients who had hemiplegia or hemiparesis; in all instances the lesion had invaded beyond the extent of operation, and none of the tumors was completely eradicated.

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

From the Section of Neurologic Surgery, Mayo Clinic and Mayo Foundation, Rochester. (The Mayo Foundation is a part of the Graduate School of the University of Minnesota.)

Submitted for publication Feb. 11, 1955

Is hemispherectomy justified for patients who are not completely paralyzed on the affected side? This would involve removal of a considerable amount of normally functioning brain. I consider this an unwise approach. More logically, one would wish to remove only the tumor, or at most the lobe affected by the tumor. *This approach to the problem best meets* the criteria of (1) reduction of increased intracranial pressure and (2) eradication of the lesion. Tumors that are bilateral or deep admittedly cannot be excised. Palliation, however, appears to be justified.[8]

Theoretically one might cure a patient who has a glioma sufficiently superficial to allow excision. Ideally such a tumor might be in the tip of the frontal, occipital or temporal lobe, or even superficially in the parietal lobe. These tumors, therefore, must be recognized early, and lobectomy or radical resection must be employed before the tumor extends further (Figs. 3, 4, 5 and 6).

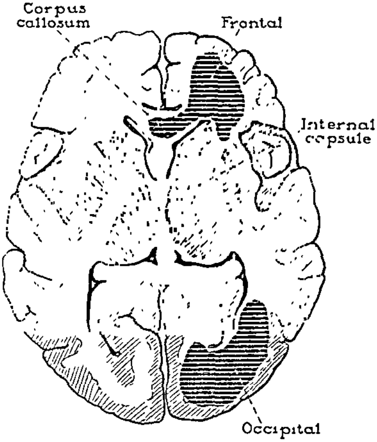

Fig. 2.—Horizontal section through the brain, illustrating the way in which a glioma in the frontal pole spreads to involve the corpus callosum or the internal capsule or both. Gliomas in the occipital pole apparently migrate into the posterior limb of the internal capsule.

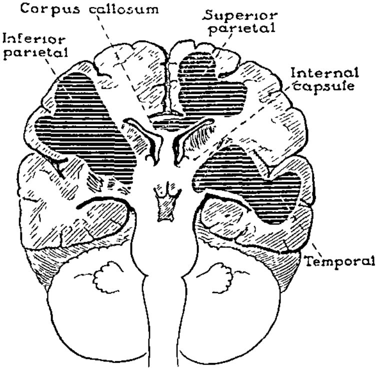

Fig. 1.—Cross section of the brain, illustrating the usual spread of gliomas. Gliomas in the superior portion of the parietal lobe usually spread to the corpus callosum initially, while those in the inferior part of the parietal lobe spread to the internal capsule and basal ganglia, as do gliomas in the temporal lobe. From the practical standpoint, these tumors are incurable when they extend as far as this.

Results.—In a review of any series of gliomas of the brain, it is practical to divide such tumors into two large groups, *supratentorial and infratentorial.* In this series, 103 of the lesions were supratentorial; 51 of these were classed as glioblastoma multiforme[9] (astrocytoma Grade 3 or 4), 4 were unclassified gliomas and 48 were other types of glioma. This last group included 18 oligodendrogliomas[10] (Grade 1 to 4), whereas 17 were of the astrocytoma-astroblastoma group (astrocytoma, Grade 1 or 2); 4 were ependymoblastomas[11] (ependymoma Grade 3), 3 were mixed astrocytoma-oligodendrogliomas and 3 were ependymo-astrocytomas. The remainder of the 48 consisted of 1 each of subependymal astrocytoma of the third ventricle, astrocytoma of the optic nerve and neuro-astrocytoma.

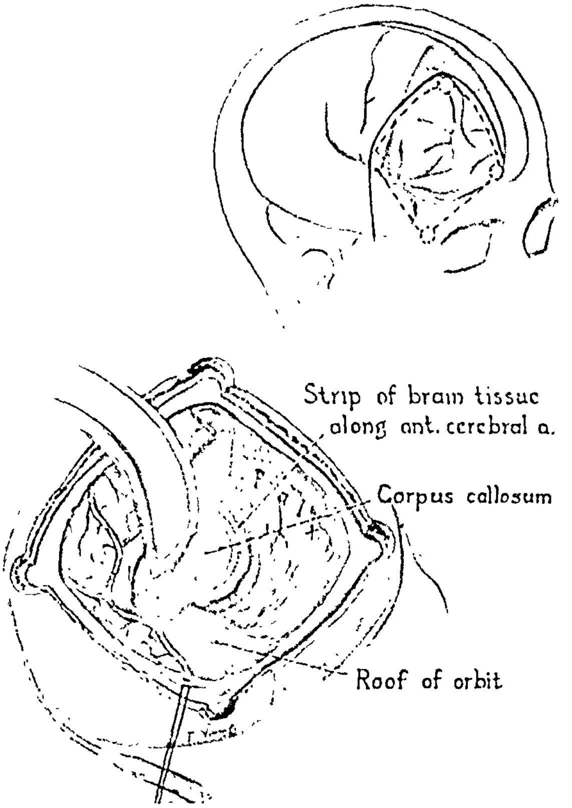

Fig. 3.—Resection of frontal lobe anterior to the ventricle.

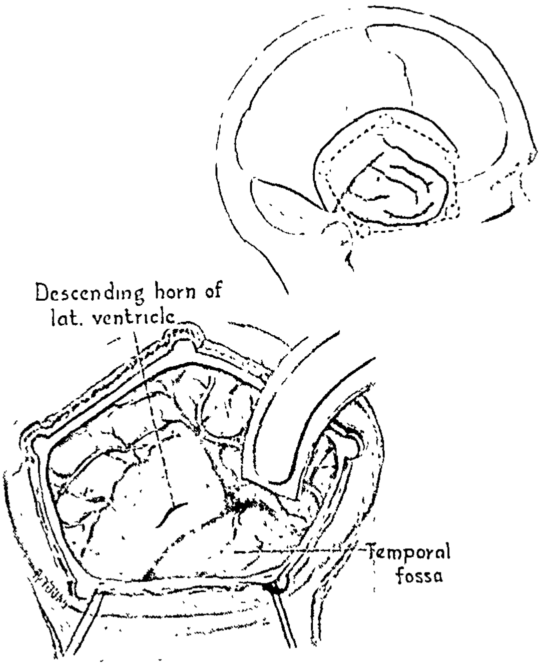

Fig. 4.—Resection of anterior portion of the temporal lobe.

Among the 103 patients there were 8 hospital deaths, 7 occurring in those who had glioblastomas and 1 among the patients who had unclassified gliomas. Thus, the hospital mortality rate was 7.8 per cent for the supratentorial gliomas.

There were 22 gliomas located below the tentorium. These included 7 ependymoblastomas, 8 cerebellar astrocytomas, 3 medulloblastomas, 3 astrocytomas of the pons and medulla and 1 mixed astrocytoma-ependymoma of the vermis. Hospital deaths numbered 1 in the ependymoblastoma group and 2 among patients who had intramedullary astrocytomas of the pons and medulla; no deaths occurred in patients who had cerebellar astrocytomas or mixed astrocytoma-ependymomas. The overall hospital mortality rate associated with the infratentorial tumors was 13.6 per cent. The hospital mortality rate in the entire series was 8.8 per cent (Table 1).

One might justifiably wonder how an astrocytoma that is intrinsic in the pons, medulla or third ventricle can be radically resected. I have considered these tumors radically resected if the portion of the tumor that is mushrooming out of the pons, medulla or wall of the ventricle has been removed. Practically, this is done to relieve obstruction to the flow of cerebrospinal fluid. Necessarily it is a hazardous procedure, but sometimes it is justified. The hazard is obvious when it is noted that 2 of the 3 patients who had such tumors in the posterior fossa died in the hospital. The procedure is justified when it is noted that the patient in whom an astrocytoma of the third ventricle was resected in July 1947 was alive and well in 1954.

Survival Rates.—Because this series represents slightly less than an eight-year experience, survival rates have been determined on the basis of three and five years respectively. I am indebted for these calculations to Mr. Robert Gage and Dr.

TABLE 1.—*Hospital Mortality Rate in 125 Cases of Glioma*

Location of Tumor	*Patients*	*Hospital Deaths* *Number*	*Hospital Deaths* *Per Cent*
Supratentorial	103	8	7.8
Infratentorial	22	3	13.6
Total	125	11	8.8

Joseph Berkson of the Section of Biometry and Medical Statistics at the clinic. The three-year group comprised those patients who were operated on three or more years prior to the time of inquiry, that is, by June 30, 1951, or earlier. Included in the five-year group were those patients who were operated on prior to June 30, 1949. Hospital deaths are excluded in the calculation of survival rates. Roentgen therapy has been utilized whenever it appeared indicated in the postoperative period; my colleagues and I consider that it has been of definite benefit in certain instances.

The three-year group numbered 66 patients, whereas 39 patients were included in the five-year group. The number of patients traced and the survival rates are indicated in Table 2.

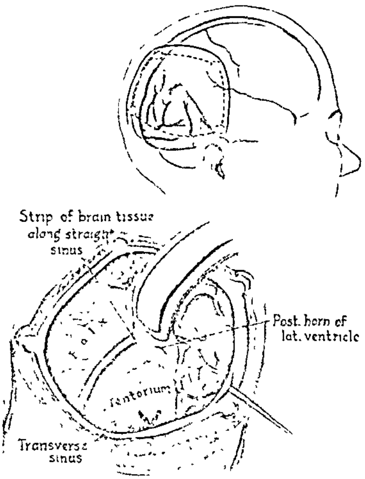
Strip of brain tissue along straight sinus
Post. horn of lat. ventricle
Tentorium
Transverse sinus

Fig. 5.—Radical occipital lobectomy.

A critical look at the data discloses some interesting observations. As has been mentioned, 51 patients had tumors classed as glioblastoma multiforme (astrocytoma Grade 3 or 4), and 7 hospital deaths occurred in this group. Twenty-two of these patients were eligible for a three-year follow-up, and 19 were traced. Only 1 of them survived three years after the operation; he was operated on in March 1951 and was still living in August 1954.

As has been indicated, 17 patients had astrocytomas Grade 1 or 2. Seven of these were eligible for three-year follow-up, and 5 survived. Five patients were eligible and traced for five years; 1 was still alive five years after the operation. Although these patients have a good short-term survival rate, the long-term prognosis is poor.

TABLE 2.—*Gliomas of the Brain: Three-year and Five-Year Survival Rates**

	Patients		*Lived Three or More Years After Operation*		*Patients*		*Lived Five or More Years After Operation*	
Location of Tumor	*Total*	*Traced*	*Number*	*Survival Rate, %*	*Total*	*Traced*	*Number*	*Survival Rate, %*
Supratentorial	54	48	22	45.8	33	29	10	
Infratentorial	12	11	10	90.9	6		6	1
Total	66	59	32	54.2	39			

*Based on traced patients; inquiry as of July 1, 1954.

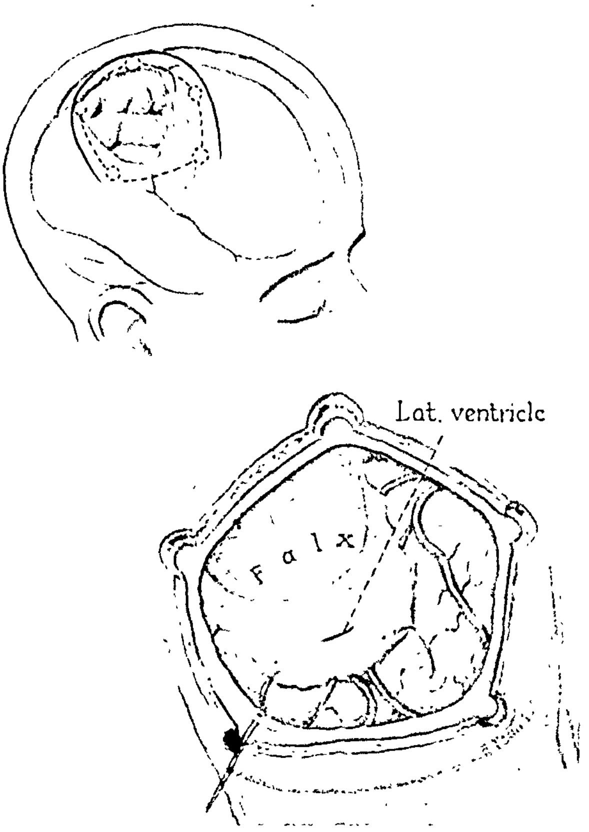

Fig. 6.—Radical parietal lobectomy extending to the falx and lateral ventricle.

Of the 18 patients who had tumors of the oligodendroglioma group, 12 were eligible for three-year follow-up; 9 were traced, and 7 survived for three years or more. Seven were eligible for five-year study; 5 were traced and 3 were still living, one for five years and 2 for six years.

Ependymoblastomas of the supratentorial portion of the brain are notably malignant.[11] As has been mentioned, 4 such tumors were present in this series. Three of the 4 patients were eligible and traced for three and five years respectively; 1 was still living more than five years after the operation.

Of the 3 patients who were operated on for mixed oligodendroglioma-astrocytomas, 2 were eligible and traced for three years or more; 1 was still living more than three years after the operation.

Of the 3 patients who had ependymo-astrocytomas, 2 were living five years and the third six years after the operation.

A few rare gliomas were noted in the series. A patient who had a subependymal astrocytoma of the third ventricle has survived seven years after the operation. Another patient has lived one year after operation for an astrocytoma of the optic nerve. A patient who had a neuro-astrocytoma was living four years after resection. Among the 4 patients who had nonclassifiable gliomas, 1 died in the hospital postoperatively; 1 died during the first year after the operation; 1 was living after four and two-thirds years, and the fourth died six years after the operation.

Attention must be called to the posterior fossa. As has been indicated, 7 patients had ependymoblastomas. One hospital death occurred in this group. The 6 remaining patients were still living after the operation, 1 for two years, 1 for three years, 2 for six years and 2 for seven years.

Among the 8 patients who had cerebellar astrocytomas, 1 was living seven years after removal of the tumor; 1 was living five years after the operation, and 2 were alive three years postoperatively; the remaining 4 were still alive at the most recent report.

Of the 3 patients who had medulloblastomas, 1 died one year after the operation and 1 died within two years; the third was still living three years after the operation.

The patient who had the mixed astrocytoma-ependymoma was still alive 1 year postoperatively. Three intramedullary astrocytomas were subtotally resected; as has been indicated, 2 hospital deaths occurred in this group, whereas the third patient was still living after one year.

COMMENT

Such an analysis as this is coldly impersonal, leaving out the human element.

In conclusion, therefore, I should like to review briefly a few cases that have highlighted this work. I have selected representative cases of the commoner gliomas in which the patients have survived for an appreciable period and at last report were still living useful lives. These lesions include tumors of the astrocytoma group above and below the tentorium. Supratentorial and infratentorial tumors of the ependymoma type are included, as well as a supratentorial mixed glioma and an oligodendroblastoma. Because no patient with medulloblastoma or glioblastoma multiforme has survived for more than five years, such lesions are not included in these interesting cases.

REPORT OF CASES

CASE 1.—A 16-year-old boy was operated on in September 1949 for a cystic astrocytoma involving the frontal, temporal, parietal and occipital lobes on the left side. He had been ill since April, complaining of headache and personality changes. He had right homonymous hemianopsia and 6 diopters of papilledema. A partial left parietotemporo-occipital lobectomy was performed. The patient was rechecked in April 1954, prior to his marriage. He was a high school graduate and was running his own business. He had minimal dysphasia and persistent right homonymous hemianopsia.

CASE 2.—A 44-year-old woman was operated on in July 1947. For three years she had been deteriorating mentally and suffering from headache and generalized weakness. She exhibited 3 diopters of papilledema on the right and 4 on the left. A grayish subependymal astrocytoma of the third ventricle was radically resected through the right foramen of Monro. Her subsequent recovery has been remarkable and without sequelae. A letter received in July 1954 stated that she was well except for a vesical infection.

CASE 3.—A 12-year-old girl noted symptoms of increased intracranial pressure in February 1946. She had papilledema of 4 diopters on the right and 3 on the left. In October 1946 most of the right cerebellar hemisphere was removed because it contained an astroblastoma. A recent letter from her doctor stated that she is married. She has no complaints, and general examination discloses no remarkable abnormalities.

CASE 4.—A 4-year-old girl was admitted to the hospital in an emergency condition in February 1947. She had had symptoms of increased intracranial pressure for a year. Three weeks earlier an inguinal hernia had been repaired. The child had become comatose on the day of admission. Examination disclosed bilateral papilledema of 3 to 4 diopters. Macewen's sign was present. The child was in opisthotonos. Babinski's sign was present bilaterally, and the patient was unconscious. Her condition appeared hopeless. An ependymoblastoma weighing 60 Gm. was removed from the fourth ventricle as an emergency measure on the night of admission. Neurologic recovery was slow but apparently complete. A letter written in July 1954 stated that she is an average student entering the sixth grade. She plays the piano and is completely well.

CASE 5.—A 22-year-old woman was examined in July 1948 because of a three-month history of fatigue, stiff neck, headache, nausea and vomiting. She had bilateral papilledema of 1 diopter. In September 1948 a Grade 3 ependymoma was removed from the right frontal lobe. A letter received in July 1954 stated that she is in excellent health.

CASE 6.—A 35-year-old woman noted the onset of focal seizures involving the left hand in April 1947. This progressed to weakness of the entire left side, associated with headache. Examination revealed left hemiparesis and hemihypesthesia, with 2 diopters of choke in the left eye and 3 in the right. At operation in August 1948 a mixed oligodendroglioma-ependymoma was observed, involving the frontal lobe and the lateral ventricle. Prefrontal lobectomy was performed. The patient made a complete and uneventful recovery. A letter in July 1954 stated that there was no evidence of the previous brain tumor.

CASE 7.—A 50-year-old farmer noted the onset of seizures in March 1946. These consisted of "dreamlike" interludes. Roentgenologic examination of the head revealed a calcified oligodendroblastoma in the right frontal lobe. Papilledema and neurologic deficits were absent. Right prefrontal lobectomy was performed in October 1947. Recovery was complete. The patient has had 3 "blackouts" since the operation. A letter in July 1954 s
that his health was better th ve nd
he was doing his own fa

SUMMARY

Treatment of gliomas of the brain includes such procedures as biopsy and decompression, radical lobectomy and hemispherectomy. Radical removal or lobectomy is the type of resection preferred by the author. The reasons for this are stressed. A survey of the results in 125 consecutive cases of glioma in which this treatment was used indicates a hospital mortality rate of 8.8 per cent, which is considered encouraging. The three-year survival rate in traced patients was 54.2 per cent, and the five-year survival rate was 45.7 per cent. Representative cases are outlined. Roentgen therapy has been used as an adjunct to surgical intervention.

ZUSAMMENFASSUNG

Die Methoden der Behandlung des Hirnglioms werden erörtert. Darunter befinden sich Probeexzision, Dekompression, radikale Lobektomie und Resektion einer Hirnhemisphäre. Der Verfasser bevorzugt die Radikaloperation oder die Resektion vom Typus der Lappenresektion. Seine Begründung hierfür wird genau angegeben. Die auf diese Weise erzielten Behandlungserfolge bei einer ununterbrochenen Reihe von 125 Gliomfällen werden dargestellt. Die Sterblichkeitsquote während des Krankenhausaufenthaltes betrug 8,8% und wird als ein ermutigendes Resultat angesehen. Die Überlebensquote nach *drei Jahren* betrug 54,2%, die nach *fünf Jahren* 45,7%. Erläuternde Krankheitsfälle werden beschrieben. Die Röntgenbehandlung wurde als unterstützende Massnahme angewandt.

RÉSUMÉ

Discussion des méthodes de traitement du gliome cérébral. Celles-ci comprennent la biopsie et la décompression, la lobectomie radicale et l'hémisphérectomie. L'auteur préfère l'opération radicale ou la résection du type lobectomie, et présente les résultats d'une série de 125 gliomes ainsi traités. Le chiffre de 8,8% de mortalité hospitalière est considéré comme encourageant. L'auteur fait état d'une survie moyenne de *trois ans*, de 54,2%, et de *cinq ans*, de 45,7%. Présentation de cas. La thérapeutique chirurgicale a été accompagnée de radiothérapie.

RIASSUNTO

Vengono discussi i diversi metodi di cura dei gliomi del cervello: la biopsia e la decompressione, la lobectomia e l'emisferectomia. L'autore preferisce la lobectomia, indica le ragioni di tale sua preferenza e riferisce i risultati ottenuti operando in tal modo 125 casi consecutivi di gliomi. La percentuale di mortalite ospitaliera (8,8%) può essere considerata incoraggiante. La quota di sopravvivenza dopo *3 anni* fu del 54,2%, e quella dopo *5 anni* del 45,7%. Vengono presentati i casi più dimostrativi. La roentgen-terapia fu usata come aggiunta alla cura chirurgica.

RESUMEN

Se comentan los métodos de tratamiento del glioma cerebral. Estos incluyen biopsia y descompresión, lobectomía radical y hemisferectomía. La operación preferida por el autor es la operación radical del tipo de la lobectomía. Se señalan las razones inherentes. Se presentan los resultados del tratamiento de 125 gliomas tratados en esta forma. El grado de mortalidad de 8.8 por ciento se considera alentador. Se presenta *una supervivencia trianual* de 54.2 por ciento y una de 45.7 por ciento a los *cinco años*. Se agregan casos ilustrativos. La roentgenoterapia se ha utilizado como un adjunto en el tratamiento quirúrgico.

SUMARIO

São discutidos os métodos de tratamento do glioma do cérebro, os quais incluem biópsia e descompressão, lobectomia radical e hemisferectomia.

O A. nutre preferências pela operação radical ou uma ressecção tipo lobectomia, sendo salientadas as regiões para tal preferência e apresentados os resultados de 125 casos consecutivos de gliomas assim tratados. A mortalidade hospitalar de 8,8% é considerada encorajadora. São apresentadas sobrevidas de *3 anos* de 54,2% e de *5 anos* de 45,7%. São apresentados ainda aguns casos ilustrativos. A radioterapia foi usada como auxiliar do tratamento cirúrgico.

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Kindness is the one commodity of which you should spend more than you earn.

—*Tiemeyer*

A friend is one to whom one may pour out all the content of one's heart, chaff and grain together, knowing that the gentlest of hands will take and sift it, keep what is worth keeping and with the breath of kindness blow the rest away.

—*Arabian Proverb*

Those who cause divisions, in order to injure other people, are in fact preparing pitfalls for their own ruin.

—*Chinese Maxim*

Tumors of the Neck of Embryonic and Epithelial Glandular Origin

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THIS presentation of some of the tumors of the neck is confined to a discussion of the embryologic anomalies that result in tumor formation and to lesions of the thyroid and the submaxillary glands.

An attempt is made to describe congenital tumors from the embryologic point of view and to emphasize the necessity of thorough dissection of all lesions to the point of their congenital origin.

The glands of epithelial origin are mentioned because of the frequency of tumor formation in them, and a discussion of their potentialities and the importance of their surgical extirpation is included.

Embryologic Defects. — Wenglowski,[1] through the study of 60 human embryos, concluded that branchial cysts develop from the thymus as it descends in the neck as a tubular structure from the third pharyngeal pouch. This is not always true, as only occasionally is thymic tissue found in branchial cysts, and often they have their site or origin in the tonsillar region of the second pharyngeal pouch rather than the third.

Hicks[2] described the development of the neck in an orderly manner. The major structures of the face and neck originate between the third and the seventh week of fetal life.

These rapidly develop to recognizable structures. The closed gut tube develops the oral cavity, and bilateral areas of thickening, with alternate depressions or grooves, form in the region of the head and neck.

These thickened areas are called arches. They develop laterally and extend toward the midline anteriorly. Between each two arches is a cleft or groove. They resemble the gills of a fish.

The pharynx develops simultaneously with the arches and the clefts as a flattened single cell layer curved toward the front, and laterally four pouches are formed. They gradually make contact with the outside clefts along the lateral side of the neck and fuse in the center anteriorly. There are many possibilities for errors in fusion of the structures that are to make the face, neck and pharynx. The thin, one-celled epithelial layer membrane between the developing pharynx and the external clefts may be incomplete, and an opening may remain which will form a branchial fistula; or an epithelial bulge may form a branchial cyst in the lateral aspect of the neck, similar to a defect in the upper part of the esophagus which ultimately may develop into an esophageal diverticulum.

These are all embryonic failures of proper fusion. Lymphoid tissue in these misplaced epithelial structures, resembling pharyngeal or tonsillar tissue, is the result of faulty fusion and inclusion between clefts and pouch. Some of them present evidence of epidermal inclusion cysts because of enclosed keratin.

The embryonic pharynx develops components of the thyroid gland, the parathyroid glands, the thymus, the mucous

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Oct. 21, 1954.

glands, the lymphoid tissue (tonsils), the eustachian tube and the middle ear.

The first pharyngeal pouch, with the associated cleft, forms the hyomandibular structure between the mandibular and hyoid arches. The pouch forms the eustachian tube and middle ear and the cleft forms the external ear and the lower jaw.

The second pouch represents the supratonsillar fossa, and the third develops into the thymus and the lower pair of parathyroid glands. The fourth pouch develops into the upper pair of parathyroid glands and furnishes tissue to the thyroid gland. Recession of the lower clefts forms the cervical sinus which is to become the lower portion of the neck.

Branchial Cysts. — These cysts occur usually at the anterior border of the sternomastoid muscle and are more often in the upper third of the neck in contrast to branchial fistulas, which are more likely to be in the lower third of the neck (Sedgwick[3]). A painless mass appears in the neck and slowly progresses.

Branchial cysts are lateral cervical cysts, in contrast to thyroglossal cysts and dermoid cysts, which are usually in the midline. The lesions are discrete and not hard and should not be mistaken for metastatic glands, thyroid adenomas, tumors of the carotid body or lymphomas.

The cysts should be excised, and the preferable approach is an adequate incision anterior to the sternomastoid muscle. The cartoid sheath, with the artery, nerve and vein, is to be protected, since the pathway is between the internal and external carotid arteries. The hypoglossal nerve is in proximity and must be recognized and protected. The tract emerges from the pharynx near the fossa of Rosenmüller and lies underneath and behind the posterior gastric muscle. The tract, like that of a thyroglossal sinus or cyst, must be completely removed. If this is done, there will be no recurrence.

Branchial Fistulas.—Branchial fistulas occur early in life and present a dimple or small opening on the side of the neck, near the lower part of the sternomastoid muscle. The diagnosis is self-evident, and little doubt should exist when a dimple or opening in this locality is observed, especially if it occasionally secretes a watery mucous substance. Early operation should be done, and usually it is best accomplished by a stepladder type of approach. An elliptic incision is made around the sinus opening, and the tract is dissected free, care being taken to protect the important structures (artery, vein, vagus and hypoglossal nerves), to the point of origin beneath the digastric muscle on the lateral aspect of the pharynx (Sedgwick).

These two structures — branchial cysts and branchial sinuses—are congenital defects but present different clinical manifestations. The age incidence, the history and the physical observations are in no way alike. The surgical approach is different, though identical so far as anatomic relations are concerned, and require the same thoroughness, i.e., complete excision of the fistulous or cystic tract.

Embryology Aspects of the Thyroid.—Between the second and third pharyngeal pouches, at about the fourth week of fetal life, there appears a small growth on the ventral wall of the pharynx—the foramen caecum. This growth progressively descends into the neck and is ultimately destined to become the thyroid gland. It descends as a hollow stalk, lined with epithelium, known as the thyroglossal duct. This epithelium-lined hollow stalk normally undergoes obliteration. Failure to do so may result in a cyst or fistula, occupying a position from its origin—the foramen caecum to the suprasternal notch, usually in the midline, just below the hyoid bone.

The tract is in direct relation to the hyoid bone, often adherent. It may be above the bone or may even pass through it, owing to the embryologic development of the hyoid bone. Because of this relation to the hyoid bone it is necessary, in all cases of thyroglossal cysts and sinuses, to remove the midsection of this bone and dissect the tract up to its point of origin at the base of the tongue. This dissection can be facilitated by placing the index finger in the patient's mouth and pressing down upon the base of the tongue. This more accurately exposes and visualizes the tract and above the hyoid bone.

If the cyst has ruptured, infection and fibrosis will be present and the epithelial tract will be replaced by fibrous tissue, with resulting surrounding adhesions.

Incision and drainage of a thyroglossal cyst is justified only when infection and inflammation are present.

Surgical Technic. — A transverse incision is made in the region of the hyoid bone over the cyst, or an elliptic one if a sinus is present. The muscular attachments to the hyoid bone are freed and a central portion of the bone removed, care being taken to separate it from the thyrohyoid membrane beneath. The tract is then dissected up to the foramen caecum. This dissection will and should include some of the fibers of the adjacent muscles —the mylohyoid, the geniohyoid and the genioglossus. As has been mentioned, this can be facilitated by downward pressure of the index finger upon the back of the tongue. The hyoid bone can be approximated by suture of the surrounding muscles and fascia in the midline. A small drain should be placed up to the depth of the excision.

The essentials of surgical treatment of lesions of the thyroglossal tract must always involve excision of the midsegment of the hyoid bone and the tract above to the foramen caecum, as emphasized by Marshall.[4] Cure will not result unless this tract is excised, and it cannot be excised without sacrificing the midsection of the hyoid bone.

The Pyramidal Lobe of the Thyroid.—This is a tonguelike projection of thyroid tissue that usually extends upward along the left lateral aspect of the thyroid cartilage. It is a projecting remnant of an incompletely descended thyroid. It is often overlooked in thyroidectomy, and subsequently it may become hypertrophied and produce an undesirable tumor formation on the side of the neck. In my experience this tonguelike projection has been observed to some degree in about two thirds of my thyroidectomies. It may well be a factor in persistent hyperthyroidism after thyroidectomy, a site for future recurrence of hyperthyroidism; in addition, it may contribute to an undesirable cosmetic result.

Lateral Aberrant Thyroid.—Discussion of the lateral aberrant thyroid continues to be controversial from the point of view of existence and relation to malignancy. A failure of the lateral components of thyroid tissue to fuse with the medial component and form the complete gland may result in aberrant thyroid tissue. Pemberton[5] expressed the opinion that this tissue is not misplaced thyroid tissue but malignant cells from the thyroid gland. Lahey,[6] between 1941 and 1946, expressed the reverse view, that the original malignant tumor is in the aberrant bodies and has metastasized to the thyroid gland. Primary cancer of aberrant thyroid tissue is extremely rare. The primary malignant change is usually in the thyroid gland.

Solitary Adenoma.—The solitary or discrete adenoma of the thyroid is not always a single lesion. Jackson[7] stated that clinically it appears as a single discrete tumor in the neck, but at operation there frequently are small adenomas associated with the clinically palpable one. These are true tumors of the thyroid, but the frequency of malignancy is controversial.

Malignancy in these nontoxic nodular tumors, however, has been reported by Cole[8] and Crile[9] to be as high as 17 to 24 per cent; by Lahey,[10] 10 per cent, and by Ward,[11] 16.6 per cent. In children the frequency is even greater. Kennedy[12] reported 12 cases of cancer of the thyroid in 62 children aged 14 or less, and Ward[11] encountered 40 per cent in a group of 16 children under 15 years of age. I received pathologic reports of 11 cases of carcinoma among 100 thyroidectomies performed for nodular goiter. Eight of the patients were between the ages of 17 and 27, and the oldest was 71.

Hinton and Lord[13] demonstrated that solitary adenomas of the thyroid that appear benign clinically have a higher incidence of malignancy than do tumors in the breast that appear benign clinically. They reported an incidence of 7.6 per cent of cancer in 194 patients who had clinically benign nodular goiter, as contrasted to an incidence of 6.7 per cent of cancer in 75 patients who had clinically benign mammary lesions. They conclude that all nodular goiters should be removed, because of the high incidence of unsuspected cancer. I concur in this opinion, regardless of whether the tumor is extremely small or large.

Multiple Nodular Goiter (Adenomatous).—Multiple nodular goiter is a degenerative process, with areas of involution and attempted regeneration. In my experience the incidence of cancer has not exceeded 2 per cent. Beahrs, Pemberton and Black[14] reported an incidence of 7.5 per cent in 3,247 operative specimens of adenomatous goiter and an incidence of 4.8 per cent of carcinoma in nodular goiter. In my opinion, carcinoma, when present, is related to a congenital or hidden solitary adenoma.

Fully one-half of all multiple nodular goiters will eventually cause clinical evidence of hyperthyroidism. Clinical observations indicate that eventually cardiac manifestations of irregularity, fibrillation and decompensation will appear, especially in persons with a limited cardiac capacity. This relation of chronic hyperthyroidism to cardiac irregularity and decompensation has been emphasized by Hertzler,[15] Lahey,[16] Davison,[17] Ginsberg[18] and others. It has been a common observation with me. It is my opinion that the degenerative nodular adenomatous goiter of the subclinical type is the true cardiotoxic goiter. Davison[17] stated that all goiters tend to be fatal, causing death by carcinoma, by thyrotoxicosis or by heart failure.

Cosmetic and mechanical factors are conditions that require removal of degenerative nodular goiter. Many of the mechanical phases are overlooked. The trachea may be narrowed and constricted, or a nodular mass may protrude through the thoracic aperture into the mediastinum without being clinically apparent. This constriction or pressure may result in an increased respiratory rate, moderate tachycardia and often respiratory embarrassment as a result of postural changes, the cause of which may not be suspected. The potentialities of nodular goiter, solitary or multiple, are not adequately appreciated by the practicing physician and need to be repeatedly emphasized.

Tumors of the Submaxillary Gland.—Tumors of the submaxillary gland are less common than are tumors of the parotid gland. Duct obstruction resulting in distention and an obvious enlargement is quite common. Inflammatory reaction may result, and the gland becomes tender and painful. Wharton's duct may become obstructed from surrounding enlarged lymph glands or from cancer in the oral cavity.

In the event that a stone obstructs the duct, the size of the swelling may fluctuate, as the obstruction relents from time to time and permits a variable degree of drainage.

A stone may be removed by dilating the ampulla and expressing the stone. It may require an incision over the duct, which should be parallel to the duct and directly down on a palpated stone. This incision must be parallel to the duct and never oblique or transverse. If the calculi are multiple or previous infection and fibrosis are present the gland and duct must be removed.

The incision should be a curved one; the platysma is divided, the facial artery ligated, the gland carefully dissected from its bend and the duct removed from behind the geniohyoid muscle.

Tumors of the gland, which are nearly always mixed tumors, as they are in the parotid gland, are approached and removed in the manner just described. If carcinoma is present, neck dissection of all lymph-bearing tissue is essential.

Cystic Hygroma of the Neck.—This is not a secretory tumor but an unsightly lymphatic enlargement resulting from sequestrations of lymphatic tissue not connected with the normal lymphatic system, as described by Goetsch.[19]

The mass is irregular and multilocular and has cystic compartments filled with a watery fluid. Pressure symptoms may result from the size of the tumor. These lesions are not to be confused with branchial cysts, enlarged lymph glands, cervical tumors or lipomas. The tumors are soft and irregular and not easily confused with the other cervical tumors.

It is not best to aspirate the cystic masses, apply irradiation or inject the cystic areas with sclerosing material. They should be removed surgically.

SUMMARY

Tumors of Neck.—Congenital defects of the neck are discussed from their embryonic origin, and the importance of complete excision of the defect to the origin is emphasized. The site or origin of the various congenital lesions is described, and the congenital failures of proper fusion resulting in these malformations are described.

The necessity of removal of the central portion of the hyoid bone in the presence of lesions of the thyroglossal tract is strongly asserted.

The development of aberrant thyroid tissue in the embrologic descent of the fetal thyroid is described. That it does occasionally occur is stated; it has been seen by the author.

The potentialities of discrete nodular goiter and multiple adenomatous goiter from the point of view of cancer mechanical effects, cardiotoxic properties and cosmetic appearance are discussed.

Ductal stones in relation to the submaxillary gland, as well as their complications and management, are considered.

ZUSAMMENFASSUNG

Angeborene Schaedigungen des Halses werden im Hinblick auf ihren embryologischen Ursprung eroertert, und die Wichtigkeit vollstaendiger Entfernung der Schaedigung bis zu ihrem Ausgangspunkt wird hervorgehoben. Die Ausgangsstellen der verschiedenen angeborenen Schaedigungen und das Ausbleiben ausreichender Verschmelzung, das zu solchen Missbildungen fuehrt, werden beschrieben.

Auf die Notwendigkeit der Entfernung des mittleren Abschnitts des Zungenbeins bei Erkrankungen des thyroglossalen Ganges wird mit Nachdruck hingewiesen.

Die Entwicklung versprengten Schilddruesengewebes beim Abstieg der foetalen Schilddruese im Embryo wird beschrieben. Dies kommt gelegentlich vor und ist vom Verfasser beobachtet worden.

Die Moeglichkeiten, die ein umschriebener knotiger Kropf und multiple Adenome der Schilddruese in Bezug auf Krebs, mechanische Einwirkung, kardiotische Ei-

genschaften und kosmetische Entstellungen in sich tragen, werden eroertert.

Auch Steinbildungen in den Speichelgaengen, ihre Beziehungen zur submaxillaren Speicheldruese, ihre Komplikationen und Behandlung sind berueksichtigt.

RÉSUMÉ

L'auteur étude les malformations congénitales de la nuque à partir de leur origine embryologique, et souligne l'importance de l'excision totale au point de départ de la lésion. Il décrit le lieu et l'origine des différentes lésions congénitales.

L'auteur affirme la nécessité de l'ablation de la partie centrale de l'os hyoïde lors de lésions du canal thyréoglosse.

Il décrit le développement de tissu thyroïdien aberrant, qu'il a lui-même observé.

Il discute les possibilités du goître nodulaire et du goître multiple adénomateux du point de vue des effets mécaniques du cancer, des effets cardiotoxiques et de l'esthétique.

L'auteur examine les calculs du canal thyréoglosse en rapport avec la glande sous-maxillaire, ainsi que leurs complications et leur traitement.

RESUMEN

Se discuten los defectos congénitos del cuello a partir de su origen embiológico, y la importancia de la extirpación completa del defecto desde su punto de origen. Se describe el sitio de origen de diversa lesiones congénitas, así como las fallas congénitas de fusión resultantes en las malformaciones.

Se señala en forma notable la necesidad de extirpar la porción central del hioides en presencia de lesiones del conducto tirogloso.

Se describe el desarrollo aberrante del tejido tiroideo en el descenso embiológico del tiroides fetal, lo que ocurre rara vez.

Se discuten las potencialidades del bocio nodular discreto y del múltiple adenomatoso desde el punto de vista de los efectos mecánicos del cáncer, propiedades cardiotóxicas y apariencia cosmética.

Se consideran los cálculos en relación con la glándula submaxilar, sus complicaciones y tratamiento.

RIASSUNTO

L'autore descrive lo sviluppo di tessuto tiroideo aberrante, in relazione alla genesi e alla discesa della tiroide nel feto. Vengono poi discusse le evenienze che possono derivare da gozzi nodulari o da gozzi adenomatosi multipli (candri. disturbi da compressione, stati cardiotossici, difetti ectetici, ecc.). Vengono presi in considerazione i calcoli del dotto della ghiandola sottomascellare, in relazione anche alle complicazioni che possono derivarne e alla loro cura.

Lo studio embriologico del collo, in relazione all'atiopatogenesi delle malformazitore a insistere sulla necessità di asportare oni congenite di tale regione, porta l'auper intero, da un capo all'altro, tali formazioni patologiche. Vengono pertanto descritte le sedi d'origine di tali malformazioni ed i vizi di sviluppo che ne sono all'origine. L'autore insiste sulla necessità di asportare la porzione centrale dell'osso joide allorchè si asportino cisti e fistole tireo-golosse.

SUMARIO

Os defeitos congênitos do pescoço são apresentados, considerando-se sua origem embriológica e salientando-se a importância da extirpação completa do defeito até ao seu ponto de origem. É descrita a localização ou origem das várias lesões congênitas, sendo descritas as falhas congênitas de fusão adequada, das quais resultam estas maformações.

A necessidade da extirpação

central do osso hióide em presença de lesões do tracto tireoglosso é salientada. É descrito o desenvolvimento do tecido tireoideo aberrante na descida embriológica da tireóide fetal. É mencionado que tal ocorre ocasionalmente; tal foi visto pelo autor.

São discutidos as potencialidades do bócio nodular discreto e do bócio adenomatoso múltiplo do ponto de vista de efeitos mecânicos cancerigenos, propriedades cárdio-tóxicas e aspetos comésticos.

São considerados os cálculos de ductos, em relação com a glândula sub-maxilar bem como suas complicações e tratamento.

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Lettuce is like conversation; it must be fresh and crisp, so sparkling that you scarcely notice the bitter in it.

—*Charles Dudley Warner*

Talk to every woman as if you loved her, and to every man as if he bored you, and at the end of your first season you will have the reputation of possessing the most perfect social tact.

—*Wilde*

Humor implies a sure conception of the beautiful, the majestic and the true, by whose light it surveys and shapes their opposites. It is a humane influence, softening with mirth the ragged inequalities of existence, prompting tolerant views of life, bridging over the space which separates the lofty from the lowly, the great from the humble.

—*Whipple*

The Silent Peptic Ulcer

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THE gastrointestinal tract is frequently afflicted with asymptomatic lesions, which may remain so until they heal or until symptoms or complications finally intervene. Many of these silent lesions, including peptic ulcers, are discovered incidentally at autopsy.[1]

Some aspects of modern peptic ulcer have radically changed from those of its predecessor of several decades ago, and much of its nature is still shrouded in mystery.

Although once rare, the change in its incidence now ranks peptic ulcer as one of our most common diseases. Ivy and his associates[2] estimated that 1 to 3 per cent of the entire population over 20 years of age suffer from this disease, and that it eventually develops in 5 to 10 per cent; and its incidence is increasing.

There is no accurate way of determining the actual ulcer incidence, but it is known that the majority of the patients seldom or ever consult a physician, and then only for the relief of persistent symptoms or the interlude of some complication.

Some other changes occurring in the ulcer picture are its shift in incidence from the stomach to the duodenum and its ratio of increase in men.[3] And to these might be added its frequent occurrence without symptoms.

The prevalence of such silent ulcers can only be roughly estimated from the high incidence of their complications as the initial symptoms of their presence. These, in my opinion, occur in only a relatively small percentage of the existing asymptomatic cases of peptic ulcer.

DeBakey[4] and Ivy and his associates,[2] as well as several others,[5] have noted, in separate reviews of the literature, that approximately 14 per cent of perforations and 16 per cent of hemorrhages occurred in cases in which no symptoms had previously been present.

Antiphlogistic hormone therapy (adrenal steroids) has been shown by Selye[6] and others[7] to intensify peptic ulcer stimulation. Such therapy may provoke complications, as in a case reported by Kerdasha[8] of perforation of an asymptomatic gastric ulcer following cortisone treatment for rheumatoid arthritis.

Asymptomatic duodenal ulcers occasionally follow some surgical procedures or occur during the course of some diseases of the central nervous system;[9] and approximately 20 per cent of Curling's duodenal ulcers complicating severe burns are silent.[10]

As is well known, asymptomatic periods of remission usually occur during the course of peptic ulcer. Orellana[11] of Quito, Ecuador, in observations of 2,737 such cases, found from repeated roentgen examinations that the ulcer craters diminish in size during these silent intervals, and reappear with the onset of new cycles. The reasons for these asymptomatic periods, and for the many cases remaining so, are not known. However, there *are* several known factors that definitely modify the ulcer and its symptoms. *All* of these influence the stimulation of motility and hydrochloric acid-pepsin formation and their effect upon the ulcer itself.

It is through the gastroduod uto

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

nomic innervation and the transmission of hormones through the blood stream that the functions of these organs are mediated, and through these also the symptoms of peptic ulcer are either stimulated or inhibited.

The vagus nerves, which *stimulate* gastric motility and secretion, end in synapses in the insensitive submucous plexus of Meissner and are intimately associated with the vascular network of the mucosa, and are also intimately associated with the myenteric plexus of Auerbach.[12]

Within the ganglionic plexus of Meissner, the efferent impulses from the vagi are transmitted. (These, and in fact *all* nerve impulses, appear to me to be forms of *electrochemical* energy emanating from cells of positive or negative polarity.) These impulses from the vagi are of the positive type and are transmitted from within the enteric plexuses to the motor and secretory cells through the media of acetylcholine[13] and histamine. These substances are *basic* in their mediation of gastrointestinal functions and, curiously, are found throughout nature in animal and plant metabolism. Feldberg[14] and Illingworth[15] have stressed this fact and have cited, as an example, the nettle, the burning sting of which occurs only after skin hyperemia is produced by histamine.

The sympathetic nerves *inhibit* motility and secretion. They terminate in the plexus of Auerbach in postganglionic axons among neuroeffector junctions in the muscle cells of the stomach and intestinal tract. It is here that visceral sensation and pain impulses originate. These are transmitted through sympathetic nerve fibers to the celiac plexus, from which they are carried through the splanchnic nerves to the dorsal root ganglia and cord, without synapse. Within the cord, the impulses ascend through conduction pathways to the higher autonomic centers in the brain. According to Kuntz,[16] these pathways are made of short neurons with frequent synaptic relays, and it may be within these that visceral pain impulses are modified or abrogated in some cases of asymptomatic peptic ulcer.

Another mechanism which stimulates and regulates gastroenteric peristalsis has been described by Alvarez[17] and others[18] as an independent, intrinsic enteric reflex mechanism energized through the masses of ganglion cells of the enteric plexuses. These cells are synaptically interconnected[16] and are probably divided in polarity, as some stimulate and others inhibit motor or secretory activity.

Somatic painful stimuli originate in the mesentery or the parietal peritoneum in penetrating ulcers and are transmitted to the spinal cord through cerebrospinal nerves to the thalamus and cortex, and are usually more accurate in localizing pain and tenderness than are visceral stimuli.

The universal plague of long-continued *stress* is productive of low physiologic resistance and vitamin deficiencies and is largely responsible for the reactions of the defense mechanism, or the general adaptation syndrome concept. This consists mainly of hormonal stimulation of the hypothalamus and adrenal glands which have recently been postulated by Gray and his associates[7] and by Porter and his associates[19] in their relation to cholinergic or adrenergic[20] stimulation of hydrochloric acid and pepsin formation which modify the intensity of ulcer symptoms.

Stress, first referred to in connection with the Neurogenic Theory of Ulcer by Brinton[21] has been well emphasized by Cushing[22] and others as being largely responsible for the increase in incidence of the "modern" duodenal ulcers, so many of which are silent. This type of ulcer has been designated by Illingworth[15] and

Ivy[2] and their associates as a *new* form of the disease.

Dragstedt[23] has shown that intense stress stimulates the vagus nerves, resulting in gastric hypersecretion and hypermotility. He and others[24] have shown that complete vagotomy abolishes parasympathetic stimulation with decreased acid-pepsin production and decreased gastric motility, with *relief* of ulcer symptoms. Frank and Gray[7] and others have observed, however, that some ulcers persist after vagotomy, and that many of these are silent and are discovered only by roentgen examination or by hemorrhage or perforation. The reestablishment of gastric motility and secretion following complete vagotomy is probably due to myenteric reflex and hormonal mechanisms that reactivate these functions.

The destruction of a segment of the myenteric plexuses in an ulcer crater results in the loss of local function but probably stimulates increased secretion and muscle spasm adjacent to it. The effects of hypersecretion and hypermotility or muscle spasm through excessive stimulating impulses from these sources increase the irritation in the ulcer crater and the inflammatory reaction in and adjacent to it, with increase in the pain reaction. Decrease in these stimulating impulses should have the opposite effect, even to making the ulcer asymptomatic; or the impulses may not be of sufficient strength to be transmitted entirely through the sympathetic pathways to the conscious level in the cortex.

Kinsella[25] observed neuroma-like bulb endings in the ulcer margins, which formed after the nerve continuity had been destroyed by tissue necrosis within the craters. From these nerve bulbs and nerve ends, pain impulses originate. He also noted that the nerves in the ulcer floors vary, sometimes being absent. When

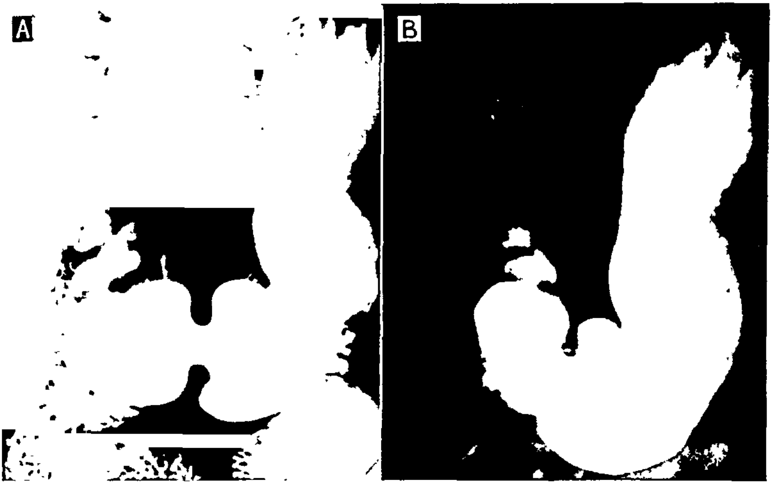

Fig. 1 *(Case 1)*.—*A*, deformity in the duodenum due to asymptomatic bleeding ulcer. *B*, ulcer deformity now healed.

present, they occur within the layers of Askanazy, which are usually resistant to acid-pepsin irritation.

It is amazing to note the types of pain reactions as described by different persons. These depend upon the degree of emotional stability possessed by the patient, and vary in everyone, as does personality. Some will complain bitterly of minor symptoms, while others will suffer intense agony with stoic indifference. In cases of peptic ulcer, one encounters all these types and various reactions. Some complain of severe ulcer symptoms but are found to have no ulcer, and they make diagnosis a difficult matter.

In the stomach, the discovery of an ulcer promptly brings up the question of malignant change, which occurs in from 10 to 20 per cent of these cases.[26] The *early* diagnosis of ulcer malignancy which is commonly asymptomatic is seldom made at this time. However, a recent seroflocculation test has been described by Penn and Dowdy[27] as being accurate in 90 per cent of some 11,000 tests made during the past six years in distinguishing between a benign and a malignant lesion. Such a test would be of incalculable value in the differential diagnosis of a gastric ulcer if it proved efficient in extended tests.

Hemorrhage in cases of peptic ulcer may vary from massive to occult. The latter may occur frequently in any peptic ulcer patient, creating secondary anemia, or the latter may be subtle in asymptomatic cases and its source difficult to find. The following case report may be of interest in this connection.

REPORT OF CASES

CASE 1 (Fig. 1).—Mrs. S. J. R., a housewife aged 55, consulted me on Jan. 29, 1954, complaining only of insomnia, weakness and fatigue. Physical examination showed her to be well-developed, with no material physical defects. A routine urinalysis gave negative results, but a blood examination showed a hemoglobin content of 53 per cent (7.7 Gm.) and a red cell count of 3,220,000 per cubic millimeter, with marked changes in the red cells. A white cell count and a differential count were within normal limits. Occult blood was observed in the stools. A complete gastrointestinal roentgen examination was then made and the duodenal ulcer deformity discovered. This patient, who is still under observation, has evidently improved, as recent roentgen examination shows a smaller ulcer deformity, the blood picture is now normal and the stools are free of occult blood. She remains free of symptoms and at the time of writing fully recovered from insomnia and fatigue.

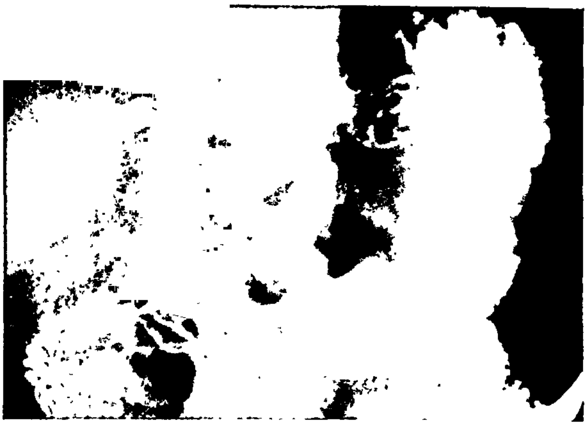

Fig. 2 (*Case 2*).—Deformity of a silent duodenal ulcer and large diverticulum of the second portion of the duodenum.

A silent ulcer may be revealed incidentally during a roentgen gastrointestinal examination for other conditions. The following case may be of interest in this connection.

CASE 2 (Fig. 2).—Mr. E. F., aged 43, two years ago underwent thyroidectomy for Hashamoto's thyroiditis and has required thyroid therapy ever since for myxedema. Aside from this, he had been in good health until March 1954, when he began to have intermittent periods of distress in the right upper abdominal quadrant. On examination some tenderness was noted in the right upper quadrant but no masses were palpable. The erythrocyte count was 4,230,000 per cubic millimeter of blood, with 12.4 Gm. or 85 per cent, of hemoglobin. The leukocyte and differential counts were normal, as was the urine. Occult blood was detected in the stools by the finger specimen and Guiac test. A complete gastrointestinal roentgen examination showed a *silent duodenal ulcer and diverticulum* and an extensive carcinoma of the hepatic flexure causing partial obstruction. A right colectomy, with removal of the right half of the transverse colon and 25 cm. of the terminal portion of the ileum, was done, and an end-to-end ileocolic anastomosis was made. Unfortunately, pathologic examination of the specimen showed metastatic nodules throughout the mesentery, one such nodule being observed in the mesentery of the terminal portion of the ileum, showing a high degree of malignancy. However, the patient made an uneventful postoperative recovery and is now under treatment for his asymptomatic duodenal ulcer.

Diagnosis.—The diagnosis of asymptomatic peptic ulcer is obviously impossible, prior to the development of complications, without a thorough gastroduodenal roentgen examination. The high incidence of ulcer hemorrhage or perforation and the stealthy spread of a malignant gastric ulcer could usually be prevented if the presence of the lesions were known beforehand. To obtain such information, greater interest is necessary in urging routine roentgen studies of the gastrointestinal tract in the mature adult.

While much progress has already been made in indoctrinating the public as to tuberculosis and cancer detection, it is hoped that eventually these will be supplemented by investigations of the gastrointestinal tract for asymptomatic lesions. This would result in the saving of many thousands of lives annually and would afford surgeons the opportunity to render greater service in the prevention of human suffering.

SUMMARY

1. From 15 to 25 per cent of all peptic ulcers are asymptomatic until some complication occurs.
2. Nearly all ulcers rapidly become asymptomatic under proper treatment. The activity of the ulcer, however, fre-

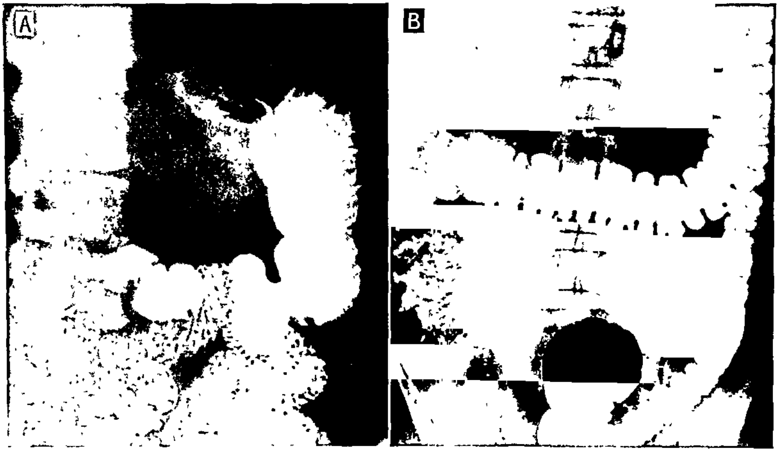

Fig. 3 *(Case 2).*—*A*, duodenal deformity due to ulcer and also diverticulum in the descending portion of the duodenum. *B*, obstructing carcinoma of the descending colon close to the hepatic flexure. Symptoms from this led to the discovery of the duodenal lesions.

quently persists during these periods of remission.

3. Many ulcers become asymptomatic regardless of any type of treatment or whether or not they are treated at all, usually depending on the improvement in the patient's mental outlook and general physical condition.

4. The only available evidence we have of ulcer healing is given by the roentgen ray and not by the symptomatic improvement of the patient.

5. Gastric ulcers are more likely to be symptom-free than are duodenal ulcers, and the symptoms of the latter are usually more pronounced.

6. The Penn-Dowdy seroflocculation test may be of value in differentiating benign from malignant lesions. Until such a test has been proved conclusive, all gastric ulcers should be regarded with grave suspicion.

7. All patients with severe burns and some patients with disease of the central nervous system should undergo roentgen examination of the upper part of the gastrointestinal tract as soon as their condition permits.

8. Owing to the increasing prevalence of peptic ulcers and other gastrointestinal lesions, it would be ideal to have complete gastrointestinal roentgen examinations at yearly intervals of all persons over 40 years of age. This would save many thousands of lives annually! Unfortunately, such examinations are cumbersome, expensive and time-consuming and are impractical at present.

9. Secondary anemia without symptoms, physical signs or known causes should be investigated for silent ulcer or some other asymptomatic gastrointestinal lesion as the possible cause. The stools in all such cases should be examined for occult blood. The prevalence of these asymptomatic gastrointestinal lesions should always be kept in mind.

ZUSAMMENFASSUNG

1. 15 bis 25 Prozent aller peptischen Geschwüre verlaufen bis zum Auftreten irgendeiner Komplikation symptomlos.

2. Bei fast allen Geschwüren verschwinden die Symptome schnell unter angemessener Behandlung. Die Aktivität des Geschwürs bleibt jedoch in den Zeiten der Remission bestehen.

3. Bei vielen Geschwüren verschwinden die Symptome ohne Rücksicht auf die Form der Behandlung oder auch wenn sie garnicht behandelt werden, was gewöhnlich mit einer Besserung des seelischen Zustandes des Kranken zusammenhängt.

4. Die Röntgenuntersuchung ist der einzige zur Verfügung stehende Weg, die Heilung eines Geschwürs nachzuweisen; auf die symptomatische Besserung des Kranken kann man sich nicht verlassen.

5. Das Verschwinden der Symptome erfolgt mit grösserer Wahrscheinlichkeit bei Magengeschwüren als bei Zwölffingerdarmgeschwüren, und die Symptome sind bei den letzteren mehr ausgesprochen.

6. Die Flockungsprobe in Serum nach Penn ist vielleicht von Wert in der Differentialdiagnose zwischen gutartigen und bösartigen Erkrankungen. Solange sich aber solche Proben nicht als überzeugend erwiesen haben, müssen alle Magengeschwüre mit grosser Skepsis angesehen werden.

7. Alle Patienten, die schwere Verbrennungen erlitten haben, und gewisse Kranke mit Störungen des Zentralnervensystems, sollten, sobald ihr Zustand es gestattet, einer Untersuchung des oberen Verdauungsapparates unterzogen werden.

8. Das zunehmende Auftreten von peptischen Geschwüren und anderen Magen-Darm-Erkrankungen lässt es als ideal erscheinen, dass alle Menschen von über vierzig Jahren eine jährliche Röntgenuntersuchung des gesamten Magen-Darm-Kanals durchmachen. Viele Tausende von

Menschenleben könnten auf diese Weise gerettet werden. Leider ist die Durchführung dieser Idee wegen der Umständlichkeit und des Zeit- und Kostenaufwandes solcher Untersuchungen zur Zeit praktisch nicht möglich.

9. Bei Fällen von sekundärer Blutarmut ohne Symptome, physische Krankheitsbefunde oder bekannte Ursache muss an die Möglichkeit eines symptomlosen Geschwürs oder anderer symptomloser Magen-Darm-Erkrankungen gedacht und eine entsprechende Untersuchung vorgenommen werden. In allen solchen Fällen muss der Stuhl auf okkulte Blutungen geprüft werden.

RÉSUMÉ

1. 15 à 25% de tous les ulcères peptiques sont muets jusqu'à l'apparition de complications.

2. Un traitement approprié entraîne la disparition rapide des symptômes dans presque tous les cas, mais l'ulcère peut rester actif.

3. Le succès du traitement est en général en rapport avec l'amélioration psychique du malade.

4. La seule évidence valable de la guérison d'un ulcère est l'examen radiologique, et non l'amélioration subjective des symptômes.

5. Il y a davantages d'ulcères gastriques muets que d'ulcères duodénaux, et dans ces derniers les symptômes sont habituellement plus marqués.

6. Le test de sérofloculation de Penn peut être précieux, mais jusqu'à ce que ce test soit considéré comme absolument concluant, il faudrait toujours envisager la possibilité d'une affection maligne en cas d'ulcère peptique.

7. Tous les malades atteints de brûlures graves, et certains malades atteints d'affections du système nerveux central, devraient subir, dès que leur état le permet, un examen de la partie supérieure du tractus gastro-intestinal.

8. Etant donné la forte augmentation des ulcères gastriques et des affections gastro-intestinales en général, l'idéal serait de faire subir èhaque année un examen radiologique complet à toutes les personnes à partir de 40 ans. Des milliers de vies pourraient ainsi être sauvées. Malheureusement ces examens sont enéreux et ils exigent beaucoup de temps; c'est pourquoi ils sont impossibles à l'heure actuelle.

9. Une anémie secondaire inexplicable et certains signes physiques devraient être examinés avec attention et faire penser à un ulcère muet ou à toute autre affection gastro-intestinale.

RESUMEN

1. Del 15 al 25 por ciento de todas las úlceras pépticas son asintomáticas, hasta que se presenta la complicación.

2. Casi todas las úlceras se vuelven rápidamente asintomáticas con un tratamieto apropiado. Sin embargo, al actividad de la úlcera frecuentemente persiste durante los períodos de remisión.

3. Muchas úlceras se vuelven asintomáticas, independientemente de cualquier tipo de tratamiento, ó aún en casos en que no han sido tratadas. Dependiendo este resultado del mejoramiento psíquico del paciente.

4. La única evidencia disponible de cicatrización ulcerosa es el examen roentgenológico y no la mejoría sintomática del paciente.

5. Las úlceras gástricas son más asintomáticas que las doudenales, siendo los síntomas de estas últimas más pronunciados.

6. La prueba de la serofloculación de Penn puede ser de valor en la diferenciación de lesiones malignas ó benignas. Hasta que esta prueba haya mostrado ser definitiva, todas las úlceras gástricas de-

ben considerarse bajo sospecha.

7. Todos los pacientes con quemaduras graves, ó algunos con enfermedades del sistema nervioso central deben someterse a un examen del tubo gastrointestinal superior tan pronto como sus condiciones lo permitan.

8. Debido al aumento de las ulceras pépticas y otras lesiones gastrointestinales, sería ideal, tener exámenes roentgenológicos gastrointestinales completos a intervalos anuales, en todas las personas de mas de 40 años de edad. Esto salvaría muchos miles de vidas, desgraciadamente tales exámenes son caros y tardados siendo poco prácticos actualmente.

9. La anemia secundaria sin síntomas, signos físicos, ó causas conocidas, debe ser investigada, teniendo en cuenta la posibilidad de una úlcera silenciosa ó alguna otra lesión gastrointestinal asintomática. Las heces fecales deben examinarse en todos los casos buscando sangre oculta.

SUMARIO

1. De 15 a 25 por cento de todas as úlceras pépticas são assintomáticas, até que surja alguma complicação.

2. Quase todas as úlceras rapidamente tornam-se assintomáticas sob tratamento adequado. Contudo, a atividade da úlcera frequentemente persiste durante esses períodos de remissão.

3. Muitas úlceras tornam-se assintomaticas independentemente do tipo de tratamento ou quer sejam tratadas ou não, o resultado dependendo em geral do estado mental do paciente.

4. O único sinal da cicatrização da úlcera é dado pelo exame radiológico e não pela melhora em sistomas apresentado pelo paciente.

5. As úlceras gástricas, com mais probabilidade ficam livres de sintomas do que as duodenais e os sintomas destas são em geral mais intensos.

6. A prova de floculação de Penn pode ter valor para a diferenciação das lesões benignas das malignas. Até que se prove a valor conclusivo desta prova, todas as úlceras gástricas devem ser encaradas sob grave suspeita.

7. Todos os pacientes com queimaduras graves e alguns com molestias do sistema nervoso central, devem ser submetidos a um exame da parte superior do tracto gastrointestinal, logo que suas condições o permitam.

8. Devido à incidência crescente de úlceras pépticas e outras lesões gastro-intestinais, seria ideal o exame radiológico gastro-intestinal completo anual, de todas as pessôas acima de 40 anos. Tal providencia salvaria milhares de vidas. Infelizmente, tais exames são incomodos, dispendiosos e demorados, sendo pois, presentemente, impraticaveis.

9. A anemia secundária sem sintomas, os sinais físicos ou causas conhecidas devem ser investigados, pois uma causa possivel é a úlcera silenciosa ou alguma outra lesão gastro-intestinal assintomática. Em todos os casos desta natureza deve ser feita pesquiza de sangue oculto nas fezes.

RIASSUNTO

1. Il 15-25% delle ulcere rimangono asintomatiche fino a che non subentra una complicanza.

2. Quasi tutte le ulcere divengono silenti dopo la cura opportuna, ma anche durante questi periodi di remissione dei sintomi l'ulcera spesso rimane attiva.

3. Molte ulcere, inoltre, divengono asintomatiche dopo qualunque tipo di cura o anche senza alcun trattamento; il loro esito dipende sopratutto dall'atteggiamento psichico del paziente.

4. L'unico dato probativo sulla guarigione dell'ulcera è quello radiologico, e non il benessere del paziente.

5. Le ulcere gastriche sono più spesso asintomatiche di quelle duodenali; queste ultime sono, di solito, molto più ricche di sintomi.

6. Il test di Penn può essere utile per differenziare le lesioni benigne da quelle maligne. A meno che questo test non si dimostri positivo, tutte le ulcere gastriche devono essere considerate sospette.

7. Tutti i pazienti con ustioni estese o con malattie del sistema nervoso centrale devono essere sottoposti ad esame radiologico del tubo digerente non appena possibile.

8. Dato l'aumento di frequenza delle ulcere e di altre affezioni del tubo digerente si dovrebbe sottoporre ogni individuo al si sopra dei 40 anni ad esame radiologico una volta l'anno. Questo provvedimento potrebbe salvare migliaia di vite. Sfortunatamente ciò non è possibile per ragioni di ordine economico.

9. Un'anemia secondaria, in assenza di altri sintomi o di una causa nota, deve essere sospettata come derivante da un'ulcera silente o da un'altra affezione del tubo digerente. In questi casi si deve ricercare il sangue occulto nelle feci.

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Neuralgia of the Ninth Cranial Nerve and Indications for Peripheral Section

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SINCE neuralgia of the ninth cranial nerve occurs sometimes in elderly persons, resulting in an exceedingly painful and debilitated condition and accompanied occasionally by cardiac complications, the following presentation may have value in the effort to achieve better management of this condition and earlier and safer surgical intervention.

As glossopharyngeal and trigeminal neuralgia occasionally occur in the elderly, these conditions are treated medically for long periods in the hope that the patient may obtain satisfactory relief for his life expectancy. It is overlooked sometimes that such persons have great vitality and for this reason continue to live and suffer when medical measures fail to give relief. When glossopharyngeal neuralgia becomes persistent the patient's intake of food is greatly reduced, his nutrition is greatly impaired, he loses weight and his vitality sinks low. In addition, there may be a weakened heart, which makes surgical treatment hazardous. The surgeon is then faced with a reconsideration and reevaluation of the accepted procedure that has been proved satisfactory, but, for reasons peculiar to the aged, debilitated patient who confronts him, is not adapted to the circumstances and may even be hazardous. The purpose of this paper is to discuss the management of a situation of this kind.

Symptoms. — Severe paroxysmal pain is the outstanding feature of neuralgia of the ninth cranial nerve. The paroxysms are sudden, and the pain extends from the region of the tonsillar fossa to the ear on the affected side. The flashes of pain may occur in succession for as long as two minutes. The interval between attacks may vary from a few minutes to several hours or days. During an attack the patient becomes motionless and is unable to speak, chew or swallow. He will hold his hand against the ear on the affected side with a finger thrust into the ear and the palm pressed against the side of the neck until the paroxysm has subsided. The attacks are brought on by chewing, swallowing and yawning.

The point of excitation is always in the distribution of the glossopharyngeal nerve, which is in the posterior one-third of the tongue, the tonsil, the anterior and posterior pillars of the fauces; the walls of the pharynx to the epiglottis; the opening into the eustachian tube; a portion of the soft palate and uvula, and the tympanic membrane. This membrane is supplied by the tympanic nerve, which arises in the petrosal ganglion. An attack can usually be precipitated by irritating the tonsillar fossa on the involved side.

Neurologic examination usually gives negative results, and there is no objective evidence of disease in the pharynx or larynx. Remissions of weeks and months are common and may last two or three years or longer.

Origin and Distribution of the Glossopharyngeal Nerve.—The glossopharyngeal

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Submitted for publication Oct. 21, 1954.

nerve is a mixed nerve, containing both motor and sensory fibers. It arises from the medulla oblongata and leaves the skull through the jugular foramen, where it lies anterior to the tenth and eleventh nerves in a separate sheath of dura. It has two ganglia. The superior ganglion lies at the entrance to the foramen. The petrosal ganglion is located at or near its exit. After emerging from the foramen, the nerve extends downward between the internal carotid artery and the internal jugular vein, beneath the styloid process. It then turns forward and disappears beneath the hyoglossus muscle to supply the tongue.

The branches of the glossopharyngeal nerve are:

1. The cutaneous sensory branch to the external ear, which arises in the superior ganglion and joins with the auricular branch from the vagus nerve, which extends to the external ear canal (Fig. 1).

2. The tympanic nerve, which arises in the petrosal ganglion and extends to the tympanic cavity to form the tympanic plexus. Here it sends filaments to the mucous membrane of the tympanic cavity, the tympanic membrane, the mastoid cells and the eustachian tube. From the plexus arises the small superficial petrosal nerve, which extends to the otic ganglion (Fig. 1).

3. The fibers of the pharyngeal nerves that arise in the petrosal ganglion. They descend along the internal carotid artery to unite with the pharyngeal branches of the vagus and sympathetic nerves to form the pharyngeal plexus, which conveys branches to the mucous membrane and muscles of the pharynx.

4. The branch to the stylopharyngeus muscle, which consists of motor fibers arising in the nucleus ambiguus and passing through the muscle to extend to the mucous membrane of the pharynx.

5. The branches to the tonsils, which arise near the base of the tongue and form a plexus about each tonsil, which in turn extends to the soft palate and to the pillars of the fauces.

6. The branches to the tongue, which are two terminal filaments containing sensory fibers extending to the mucous membrane that covers the posterior third of the tongue, the glossoepiglottic and the pharyngoepiglottic folds and the lingual surface of the epiglottis.

Differential Diagnosis.—There are two types of ninth nerve neuralgia. The one is confined to the ear and involves the tympanic nerve, which arises in the petrosal ganglion and extends through the tympanic plexus to the tympanic membrane (Fig. 1). The entire ninth nerve is not involved. The other is located in the throat and the pain deep in the ear develops secondarily. Both types are relieved by section of the ninth nerve above the superior ganglion.

Neuralgia of the ninth nerve must be differentiated from trigeminal neuralgia involving the second and third divisions of the fifth cranial nerve. In cases of trigeminal neuralgia the paroxysms of pain extend over one or more of the three branches of the fifth cranial nerve. The pain may be precipitated by exposure of the face to cold air or cold water as in washing or shaving, or by chewing and swallowing. Pain in the third division may resemble that of glossopharyngeal neuralgia located in the throat. Pain in the second division may simulate that of glossopharyngeal neuralgia confined to the ear. The pain of glossopharyngeal neuralgia in the throat can be differentiated from that of neuralgia of the third division of the trigeminal nerve by cocainization of the throat of the patient on the side involved. While the irritable area is anesthetized, the patient is free from paroxysms of pain, which cannot be precipitated by irritating the tonsillar fossa.

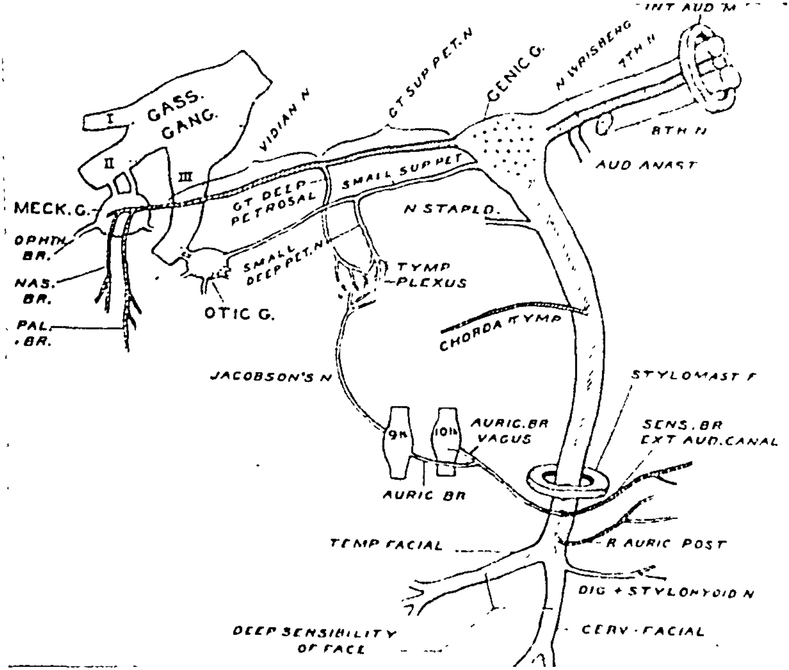

Fig. 1.—Diagrammatic representation of the facial nerve, showing the geniculate ganglion and its sensory root and peripheral divisions. The sensory system is shaded. (After Ramsay Hunt. Geniculate Neuralgia, Arch. Neurol. & Psychiat. 37:253, 1937).

If the pain is of trigeminal origin, cocainization of the throat will have no influence, whereas injection of procaine hydrochloride into the third division through the foramen ovale will give relief. Likewise, the pain in the ear caused by glossopharyngeal neuralgia may be differentiated from that of the second division of the trigeminal nerve by injection of the second division of the trigeminal nerve with procaine hydrochloride through the foramen rotundum, which will not give relief if the pain is of glossopharyngeal origin. It must be borne in mind, however, that glossopharyngeal and trigeminal pain may occur simultaneously on the same side. In a condition of this kind the same differentiating tests are used, but they require keen discernment on the part of the examiner.

Neuralgia of the sphenopalatine ganglion (Sluder's) is not a common condition. It may be associated with pain in the side of the neck, the cheek and nose, and the side of the tongue. The application of cocaine to the sphenopalatine ganglion will give relief.

Neuralgia of the nerve intermedius,

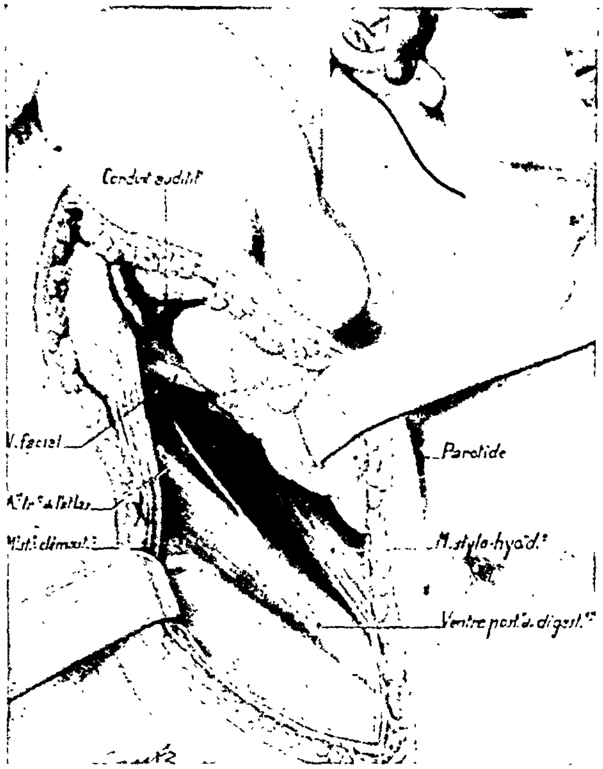

Fig. 2.—Approach to the posterior subparotid space. The facial nerve is marked accordingly as the nerve that innervates the posterior belly of the digastric muscle, and the parotid is retracted to the maximum. In the enclosure above the skin incision is traced. (After Welti and Chavany.)

sensory root of the seventh nerve, or of the geniculate ganglion, produces pain confined to the external ear. If the trigger point of the nerve is in the tragus of the ear, neuralgia of this nerve is the most probable diagnosis. It was treated by Furlow (1941) by dividing the nervus intermedius.[2] If there is a question as to whether the pain is in the external ear and due to involvement of the nervus intermedius or in the tympanic membrane and due to involvement of the tympanic nerve, which is a branch of the ninth nerve, it is advised that the operation be performed with local anesthesia. By this procedure the pain can be produced by irritating each nerve in turn after exposure at operation and sectioning the one involved.

Tabetic laryngeal crisis should also be considered in the differential diagnosis. There may be attacks of laryngeal spasm, with pain in the early stage. Later there is progressive respiratory dyspnea. Finally there is complete paralysis of the laryngeal muscles, with loss of the voice.

Acute septic inflammation of the pharynx resembles a severe attack of acute tonsillitis. The patient is seized with sudden pain in the throat and has great difficulty in swallowing. There is fever. The pulse is full and rapid. Congestion and swelling of the throat are observed.

A rare type of neuralgia from which neuralgia of the ninth nerve must be differentiated is that of the superior laryngeal nerve of the vagus, reported by Love and his co-workers.[1] Because of the intimate anatomic and physiologic association between the glossopharyngeal and vagus nerves, the pain of the superior laryngeal nerve may suggest glossopharyngeal neuralgia. The neuralgic pain of this nerve is lancinating and paroxysmal but is located in the neck and not in the throat or face. It is situated over the hyothyroid membrane, which is tender on palpation. The pyriform sinus on the affected side is the point of excitation. Cocainization of the sinus thus serves to distinguish this neuralgia from the neuralgia of the fifth or ninth cranial nerve.

Resumé of Literature.—Sicard and Robineau in 1920 were the first to describe glossopharyngeal neuralgia but they were not certain of its ninth nerve origin.[3] They discussed three cases in which their treatment consisted of peripheral section of the glossopharyngeal nerve, the pharyngeal branches of the vagus and the branches of the superior cervical ganglion. The patients obtained relief from pain.

Harris reported in 1924 2 cases of untreated glossopharyngeal neuralgia, in both of which the patients were followed for ten years.[4]

Doyle in 1923 reported 4 cases of glossopharyngeal neuralgia.[5] In 1 case the posterior portion of the gasserian ganglion was sectioned, with no relief from pain. Later, a peripheral section of the ninth nerve and the pharyngeal branches of the tenth nerve was done, giving relief from pain. In another case the third division of the trigeminal nerve and its auriculotemporal branch were treated by injection, without relief from pain.

Adson in 1924 reported 4 cases.[6] He relieved the pain in 2 cases by doing a peripheral avulsion of the nerve. He described the procedure for peripheral avulsion of the ninth nerve and also that for intracranial section of the same nerve. He advocated the latter procedure because, in his opinion, glossopharyngeal neuralgia may have its origin in the superior ganglion, and, because avulsion might fail to extract this ganglion, there might be a recurrence of the disease; and second, because the procedure was no more formidable than the neck dissection and might be expected to provide a permanent cure.

Singleton reported, in 1926, 2 cases of glossopharyngeal neuralgia, one of which was relieved by peripheral avulsion of the ninth nerve.[7]

In 1926 Fay also reported 2 cases of glossopharyngeal neuralgia, which he had treated by intracranial section of that nerve.[8]

Dandy reported, in 1927, 2 cases of intracranial section of the ninth nerve for ninth nerve neuralgia, with complete relief.[9] He also determined the sensory distribution and the function of the ninth nerve and demonstrated that it is not necessary to section the fibers from the vagus nerve to the pharynx in order to relieve the pain. He also demonstrated that taste is lost in the posterior third of the tongue on the operatively treated side and showed that there was no loss of motor function after intracranial section of the ninth nerve.

Chavany and Welti reported in 1932 cases of ninth nerve neuralgia relieved by peripheral section of the ninth nerve.[10]

Further cases have been reported and intracranial section of the ninth nerve discussed by some, viz. Hansel,[11] Keith,[12] Usadal,[13] Jefferson,[14] Reichert,[15] Filatov,[16] Bell,[17] Peet,[18] Hoover and Poppen,[19] Smith, Moersch and Love,[1] Love,[20] Pastore and Meredith,[21] Robinson and Bonica,[22] Seitelberger and Bornschein[23] and Blaha.[24]

Indications for Peripheral Section.—As neuralgia of the ninth nerve is not a common disease, the author's experience has included only 3 cases of this type of neuralgia. In 2 of these the diagnosis was made with no difficulty, and the condition was treated by intracranial section of the ninth nerve. The patient in the third case presented both the problem of diagnosis and the problem of treatment. During the management of this patient's case there were present certain conditions that determined the choice of surgical procedure.

Old Age: The patient, Mrs. M. D., was 85 years old. For ten years she had inter-

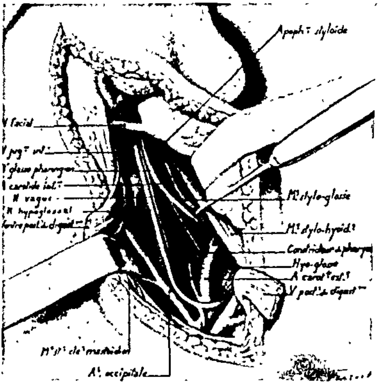

Fig. 3.—Exposure of the glo
nerve. The styloglossus muscle is
landmark for identifying the n
after Welti and Chav

mittent attacks of burning, shooting pain in the left side of the upper part of the throat, in the tonsillar region and at the base of the tongue. The pain radiated upward to the front of the left ear and outward to the left side of the face and forward along the left cheekbone.

The first attacks occurred when the patient was 75 years of age. They were mild and infrequent, occurring every four to six months. Then, the attacks became more severe and more frequent and a physician was consulted. Because at that time the pain was felt not only in the throat and on the left side of the tongue but anterior to the left ear and along the left cheekbone, the condition was considered to be left trigeminal neuralgia. Vitamen B complex was given intramuscularly and by mouth in ample doses for four weeks. Trichlorethylene by inhalation was also given during severe paroxysms, to reduce the pain. Finally relief from the attacks was obtained for about nine months.

Intractable Pain: At the end of this time the patient had another attack, similar to the previous attack in the distribution of the pain. Vitamin therapy in the form of thiamine chloride was administered both intramuscularly and intravenously, in large doses, with no relief from pain. The attending physician referred the patient to a neurosurgeon, who made an injection into the left gasserian ganglion through the foramen ovale, causing anesthesia in the left cheek area, supplied by the second division, and the lower jaw area and left side of the tongue, supplied by the third division. However, there was no relief from pain in the throat, the tonsillar region or the base of the tongue on the left side. It was at this time a diagnosis of glossopharyngeal neuralgia was made.

Surgical treatment was considered. A complete physical examination, however, revealed that this woman, who was at that time 81 years old, had an irregular and weakened heart that made surgical intervention a risk. There would be remissions from the attacks of pain for one to four weeks at a time, either with or without vitamin therapy. True, since the patient was old and frail, and because of her irregular cardiac condition, she would live only a few months longer. It was overlooked, however, that this woman came from a hardy stock and for this reason she had lived to be as old as she was and would probably outlive the expectations of her physicians.

Pain of Organic Origin: As time passed, the exacerbations of pain became more frequent and more severe and the remissions fewer and of shorter duration. At the age of 84 and when vitamin B_{12} was available, the patient was given 1 mg. intramuscularly daily for two weeks, with no relief. To make the situation more difficult for the patient, there was an opinion that she had suffered pain for so many years that a pain pattern had been established in the cortex of the brain. It became a question how much of the patient's suffering was of psychogenic origin and how much was of organic origin.

Weakened and Debilitated Condition: My own first examination of this patient revealed her sitting in bed with one finger of the left hand thrust into the left ear and the palm of the hand pressed against the left side of the throat. She sat tense and still, with her eyes closed, during each paroxysm of pain. She was unable to swallow because swallowing precipitated the pain. For two weeks she had ingested very little, her diet consisting mainly of liquids and soft foods. Consequently she was very thin and weak.

Complications: There was some tenderness in the left tonsillar region on palpation of the neck, but no masses and no rigidity. The lungs were clear and resonant. Although auscultation revealed the heart rate and rhythm to be only occasionally irregular, the electrocardiograph showed moderate myocardial damage, with a typical bundle branch block and evidence suggesting left ventricular hypertrophy due to arteriosclerotic heart disease. There was no evidence of congestive failure. The urine contained no albumin, sugar, bacteria or casts. The red blood cell count was 3,950,000 per cubic millimeter; the white cell count, 3,300; the value for hemoglobin was 10.5 Gm., or 65.6 per cent.

Morale: Painting the left tonsillar region and the base of the tongue with cocaine gave temporary freedom from pain. In the short period of relief that followed the patient exhibited an alertness of mind, a sense of humor and a faith seldom encountered except in those of a similar vintage who attain the age of 84. Thereupon I decided to give her surgical relief from the pain.

Adaptability of Peripheral Section: Whether a given surgical procedure is indicated or not will depend upon what it will do to and for the patient. It is granted that a new method supersedes an older one because it is safer and will accomplish more for the patient, and will be more expeditious for the surgeon. Sometimes the older or former procedure is the one of choice, because it meets all three of these requirements in a given patient's condition. Consideration was given to intracranial sectioning of the ninth nerve through a cerebellar craniectomy. The position of choice in this procedure is the sitting-up position. This patient, however, was too weak to sit up in bed for more than thirty minutes; the position was also an unfavorable one for the anesthetist to deal with cardiac arrest and falling blood pressure, should these occur. The prone position with the patient's head in a cerebellar headrest presented a more difficult situation both from the standpoint of the surgeon as from that of the anesthetist, who maintained the right to easy and instant access in order to deal with respiratory failure, cardiac arrest and falling blood pressure. For these reasons it was decided to do a peripheral section of the ninth nerve with the patient in the supine position.

Management of the Debilitated Patient.—It was decided by all concerned to operate as soon as feasible. It was noted that the only agent which gave the patient relief from pain was morphine, 1/6 gr. given intravenously at least once a day and sometimes twice a day. For ten days before the operation she was given thiamine chloride intravenously, 100 mg. daily. She was also given a nutritious liquid and soft diet. [illegible], 0.2 mg. daily, was given to regulate and strengthen the heart muscle. The patient was encouraged to sit up in bed and in a chair every day. At the conclusion of the ten-day period she was given a blood transfusion.

It was decided to do an endotracheal intubation and to give sodium pentothal intravenously and nitrous oxide inhalation anesthesia. An hour and a half before the operation, 1½ gr. of nembutal was given by mouth, and one hour before the operation morphine sulphate, ½ gr., and scopolamine, 1/150 gr., was given intramuscularly. This preoperative medication enabled the anesthetist to maintain anesthesia with a small amount of sodium pentothal, namely, 0.3 Gm. given intravenously. During the procedure 540 cc. of a 5 per cent solution of dextrose in water and 500 cc. of blood were also given.

Technic of Peripheral Section.—The cutaneous incision was made parallel to the anterior border of the sternomastoid muscle (Fig. 2). It extended upward 3 cm. above the tip of the mastoid process behind the ear and 10 cm. downward from the tip of the mastoid process. After exposure of the process, half of the attachment of the sternomastoid muscle w divided and retracted outward to obtain a wide exposure. The dissection then proceeded inward and upward behind the angle of the mandible and along the skull. In this maneuver the posterior belly of the digastric muscle, as well as the stylohyoid muscles, was divided, and the parotid gland was gently retracted upward and outward.

The spinal accessory nerve then came into view (Fig. 3). This nerve extends obliquely downward and outward from the jugular foramen, then underneath the posterior belly of the digastric muscle. At this stage the hypoglossal nerve also comes into view, as it lies superficial and lateral to the jugular vein. The jugular vein was then dissected free and the vagus nerve exposed, together with its mesial pharyngeal branch, which might be mistaken for the glossopharyngeal nerve. By dissection upward to the jugular foramen this branch was identified as part of the vagus nerve. By medial dissection the internal carotid, and then the upper portion of the cervical sympathetic ganglion, were encountered. After the vagus nerve, the internal carotid and the sympathetic nerves had been identified, the glossopharyngeal nerve was observed emerging from the jugular foramen, anterior to the vagus nerve. It then crossed anterior to the internal carotid, dipping beneath the styloid process and following a downward course along the posterior belly of the styloglossis (stylopharyngeus) muscle, after which it disappeared beneath the hyoglossis muscle.

After the glossopharyngeal nerve had been exposed, the patient was given an extra amount of sodium pentothal intravenously, and the nerve was grasped with forceps and drawn downward. (It should be suggested that, if it is not desirable to use more sodium pentothal, the nerve can be infiltrated with sufficient 1 per cent procaine hydrochloride at the jugular foramen to swell the nerve slightly.)

As the nerve was drawn downward, the petrosal ganglion, located at the exit of the jugular foramen, came into view, and the superior ganglion above it could be seen. The objective was to section the nerve above the superior ganglion, because if it were left intact its cutaneous sensory branch, which extends to the external auditory canal through the auricular branch of the vagus, might be the site of neuralgic pain in the ear later. For this reason the nerve was drawn downward as far as possible without avulsing it.

It was evident that avulsion might tear the nerve below the superior ganglion. This ganglion became attenuated with pulling, and with small, fine scissors the nerve was sectioned as high as possible, there being no question that most of the superior ganglion was below the level of the sectioning.

The wound was closed in layers. The divided muscles were united with mattress sutures of black silk. The subcutaneous tissue and fascia were closed with No. 0 plain catgut sutures. The skin was closed with No. 000 black silk.

The patient awakened shortly after withdrawal of the intratracheal tube. She was given general surgical care and made an uneventful recovery.

For the first three days the left side of the throat was swollen and painful, making it difficult for her to swallow. Then she began to ingest food as she had not done for many months.

Results.—The results of the operation were gratifying to all concerned. The patient returned to her home on the seventh postoperative day and was able to be up and about. She ate moderately well and gained eight pounds in weight. She lived for one year after the operation, free from pain.

SUMMARY

Neuralgia of the ninth cranial nerve is a definite disease. It has its origin in the superior and petrosal ganglia of the ninth nerve, more probably the former.

In differential diagnosis one should consider trigeminal neuralgia involving the second and third divisions of the fifth cranial nerve, neuralgia of the sphenopalatine ganglion, neuralgia of the nervus intermedius, tabetic laryngeal crisis, acute inflammation of the pharynx and neuralgia of the superior laryngeal nerve.

The indications for peripheral section of the ninth nerve are old age, intractable pain (the pain must be of organic origin), a weakened and debilitated condition, complicating cardiac disease, and high morale, and the procedure should be adapted to the patient under consideration.

While intracranial division of the ninth nerve offers a permanent cure for neuralgia of this nerve, it may be hazardous for certain elderly, debilitated patients with cardiac infirmities. Peripheral section of the ninth cranial nerve as close to the top of the superior ganglion as possible gives relief from pain. The procedure is described. Though it may be difficult if the patient has a short, thick neck, it offers no unusual difficulty in the thin, wasted neck of the elderly debilitated patient.

ZUSAMMENFASSUNG

Die Neuralgie des neunten Hirnnerven stellt eine eindeutige Krankheitseinheit dar. Sie hat ihren Ursprung im oberen und im Felsenbeinganglion des neunten Nerven, mit groesserer Wahrscheinlichkeit im ersteren.

Beruecksichtigung in der Differentialdiagnose erfordern die den zweiten und dritten Ast des fuenften Hirnnerven befallende Trigeminusneuralgie, die Neuralgie des Ganglion sphenopalatinum, die Neuralgie des N. intermedius, die tabische Kehlkopfkrise, die akute Rachenentzuendung und die Neuralgie des oberen Kehlkopfnerven.

Die Indikationen zur peripheren Durchschneidung des neunten Hirnnerven sind vorgeschrittenes Lebensalter, unbeeinflussbare Schmerzen (der Schmerz muss organischer Natur sein), geschwaechter und heruntergekommener Gesamtzustand und komplizierende Herzkrankheit; die Durchfuehrung der Operation muss dem seelischen Zustand des Kranken angepasst werden.

Die Durchschneidung des neunten Nerven innerhalb des Schaedels fuehrt zwar zur endgueltigen Heilung der Neuralgie des Nerven, birgt aber bei gewissen aelteren und geschwaechten Kranken mit nicht stabilem Herzen Gefahren in sich. Die periphere Durchschneidung des Nerven moeglichst nahe am oberen Ende des oberen Ganglion fuehrt zum Nachlassen des Schmerzen. Das Verfahren wird beschrieben. Waehrend die Ausfuehrung der Operation bei Kranken mit kurzem dicken Hals schwierig sein kann, stellt der duenne abgemagerte Hals des aelteren geschwaechten Patienten dem Eingriff keine besonderen Hindernisse in den Weg.

RIASSUNTO

La nevralgia del IX paio di nervi cranici è una malattia vera e propria. Prende origine nel ganglio superiore e petroso del nervo stesso, più spesso dal superiore. Nella diagnosi differenziale bisogna considerare la nevralgia del trigemino, seconda e terza branca, la nevralgia del ganglio sfenopalatino, quella del nervo intermedio, le crisi laringee tabetiche, le infiammazioni acute del faringe e la nevralgia del n. laringeo superiore. Indicazioni alla terapia chirurgica (la resezione periferica del IX nervo) sono rappresentate dall'età, dal dolore resistente ai medicamenti, da condizioni generali scadute, in presenza di malattia di cuore, ecc. Il metodo deve es-

sere deciso caso per caso. La sezione intracranica del nervo porta ad una guarigione definitiva, ma può riuscire pericolosa negli individui di età e nei cardiopatici. Quella periferica, a livello del ganglio superiore, e quanto più possibile vicina ad esso, porta sollievo al dolore. Viene descritta la tecnica degli interventi, che può riuscire difficile negli ammalati con collo corto e grosso, ma che di solito—è semplice nei soggetti debilitati, anziani e con collo sottile.

SUMARIO

A nevralgia do 9° nervo craniano constitue afecção definida. Tem sua origem nos gânglios superior e petroso do 9° nervo, mais provàvelmente no primeiro.

O diagnóstico diferencial deve abranger a nevralgia do trigêmeo, compreendendo a segunda e quinta divisões do 5° nervo craniano, a nevralgia do gânglio esfenopalatino, a nevralgia do nervo intermédio, as crises tabéticas laringeas, a inflamação aguda da laringe e a nevralgia do nervo laringeo superior.

As indicações para a secção periférica do 9° nervo são a idade avançada, a dôr incurável (a dôr deve ter origem orgânica), condições de enfraquecimento e de debilidade, complicação por afecção cardíaca e boa disposição moral; o método a ser empregado deve estar adaptado ao paciente em consideração.

Embora a secção intracraniana do 9° nervo ofereça cura permanente para a nevralgia dêste nervo, pode ser perigosa para alguns pacientes de idade, debilitados e com afecções cardíacas. A secção periférica do 9° nervo, tão perto quanto possível do gânglio superior traz alívio da dôr. Tal método é descrito; embora possa êle ser difícil caso o paciente tenha pescoço curto e grosso, não oferece dificuldade no paciente magro de pescoço fino, como acontece nas pessôas idosas e debilitadas.

RÉSUMÉ

La névralgie du nerf cranien est une affection définie. Elle a son origin dans les ganglions supérieurs et de la région pétrotympanique du temporal du 9e nerf, et plus probablement dans les premiers.

Dans le diagnostic différentiel il faudrait tenir compte de la névralgie du trijumeau comprenant la 2e et la 3e divisions du 5e nerf, la névralgie du ganglion sphénopalatin, la névralgie du nerf intermédiaire, la crise laryngée tabétique, l'inflammation aiguë du pharynx, et la névralgie du nerf laryngé supérieur.

Les indications de la section périphérique du 9e nerf sont anciennes. Il faut tenir compte de la douleur opiniâtre, d'un état de moindre résistance du patient, de la complication d'une affection cardiaque, il faut créer un bon climat moral, et adapter la technique à chaque cas particulier.

La division intracranienne du 9e nerf amène un soulagement permanent de la névralgie de ce nerf, mais elle peut être risquée chez certains malades âgés, affaiblis et cardiaques. La section périphérique du 9e nerf aussi près que possible du ganglion supérieur soulage la douleur. La technique est décrite. Elle peut être difficile à pratiquer chez un patient à nuque courte et épaisse, mais n'offre pas de difficulté lorsqu'on se trouve en présence de malades affaiblis à nuque mince et décharnée.

RESUMEN

La neuralgia del noveno par craneal es una enfermedad definida, con su origen en los ganglios superior y petroso de dicho nervio, más probablemente en el último.

El diagnóstico diferencial debe comprender la neuralgia trigeminal que afecta la segunda y tercera división del quinto par, neuralgia del ganglio esfenopalatino, neuralgia del nervio intermedio, crisis tabética laríngea, inflamación faríngea

aguda y neuralgia del nervio laringeo superior.

Las indicaciones para la sección periférica del nervio son ancianidad, dolor pertinaz (de origen orgánico), estado general malo, padecimiento cardiovascular y moral elevada. El procedimiento debe adaptarse a cada paciente.

Mientras que la división intracraneal del quinto nervio ofrece cura permanente para la neuralgia de éste, puede ser un riesgo considerable para ciertos viejos, pacientes debilitados o cardíacos. La sección periférica del noveno par craneal debe ser lo más cerca posible a la punta del ganglio superior. Se describe el procedimiento. Aún cuando puede ser difícil en un paciente con cuello corto y grueso, no ofrece dificultades en el cuello delgado del paciente viejo debilitado.

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You canna expect to be baith grand and comfortable.

—*Barrie*

Lung Cancer in the Twentieth Century

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FIFTY years ago a diagnosis of primary cancer of the lung was a rare event. During this period, and particularly in the past two decades, the disease has emerged from obscurity to become an important cause of death in at least a dozen countries. According to Dorn, "Today one can fairly say that cancer of the lung exists as a pandemic disease in North America and in the industrialized countries of Northwest Europe."[1] Clemmesen describes the lung cancer increase as "the most violent phenomenon in the history of cancer."[2]

Sudden pandemicity and violent change are conduct unbecoming in a so-called chronic disease. For any form of cancer rates to rise by leaps and bounds is to behave in a most uncancerlike manner, and to cry out for explanation. A range of possible explanations — most popularly cigaret smoking, industrial carcinogens and atmospheric pollution—is under investigation in various countries; suffice it to say that no other field of cancer investigation has stirred up a livelier controversy, or one with such far-reaching personal, social, and economic implications.

Underlying this controversy and subtly distracting attention from the real problems are the remnants of an earlier controversy: whether the recorded rise in pulmonary cancer reflects a real increase in the incidence of the disease or is merely a medical and statistical artifact due to improved means of diagnosis and general aging of the population.

Has lung cancer actually increased? Or are physicians finding more cases because they are now alert to it and have developed appropriate facilities and technics for diagnosing it?

For most parts of the world the data are probably still inadequate to yield firm answers. In a few countries, where the reporting system has been maintained for a long period at a high level of thoroughness, and where the statistics are available in such detail as to permit internal analysis, an unequivocal answer can be made. In such countries, the hypothesis that all or even most of the recorded increase in lung cancer may be an artifact is grossly inconsistent with the data.

Although diagnostic improvement and aging of the population could conceivably account for even a very large *general* increase in the reported mortality rate for lung cancer, this explanation is inconsistent with the following special features of the increase:

1. The size of the increase is very different for men and women; since the early 1930's the disproportionate increases have greatly widened the gap between the rates for the two sexes.

2. The rates of increase vary considerably for different age groups.

3. The rates are continuing to increase sharply from year to year, without a commensurate improvement in diagnostic facilities and technics.

In two countries, the United States and Denmark, the prevailing patterns shown

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons. Chicago, Sept. 8, 1954.
Submitted for publication Nov. 10, 1954.

in the mortality data are confirmed by intensive surveys of cancer morbidity.

Necropsy studies, which undoubtedly provide the surest diagnosis in individual cases, have been of dubious value as a measure of the incidence of lung cancer in the general population. All of them consist of cases drawn from hospital populations, but no one can say what part of the general population they represent. Hence a change in the number of lung cancers observed on autopsy may be due to changes in the composition of the hospital population, or to unknown biases in the selection of cadavers for autopsy. Gilliam[3] has pointed with justified asperity to the "deplorable and almost universal tendency in the literature of pathology to draw from autopsy data firm epidemiologic conclusions which at best should be regarded in the same light as clinical impression."

The precaution of matching the autopsy records with the death certificates and classifying the autopsied persons by age, sex, race, place of residence, occupation and certified cause of death would add greatly to the value of autopsy data. Comparison of the demographic characteristics of the autopsy subjects and all deaths registered during the same period would give some indication of the relation of the autopsy group to the general population.

Despite the "jokers" and pitfalls in the autopsy material, however, it is perhaps worth noting that recent studies in England and the United States show substantial increases in the proportion of lung cancers observed at autopsy.[4]

For the most part, however, judgment must be based on evidence derived from vital statistics—on the death certificates filled in by physicians according to internationally prescribed rules and collected, compiled and published by the official vital statistics agencies of the various countries. The value of these statistics, as a true measure of the mortality rate, depends largely on the completeness of death registration and the accuracy with which causes of death are diagnosed and reported. Between countries, and within individual countries from one period to another, these factors may vary considerably. For this reason, though lung cancer is a world-wide phenomenon and occurs in all major ethnic groups, international comparisons can be made only in the broadest terms and on a tentative basis.

Lung cancer in current vital statistics generally means deaths assigned to two

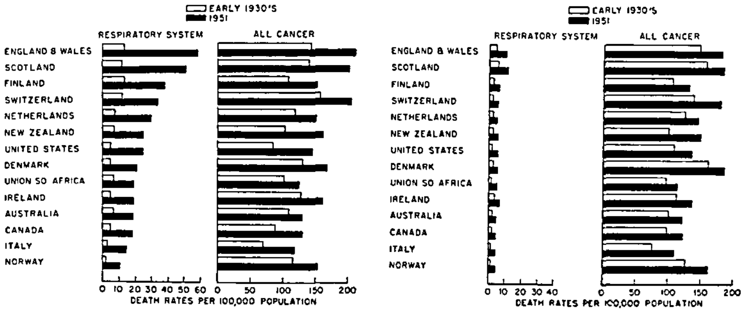

Fig. 1.—Crude mortality rate for cancer in selected countries; *left*, women· men ctual years referred to as "early 1930's" see Table 1.

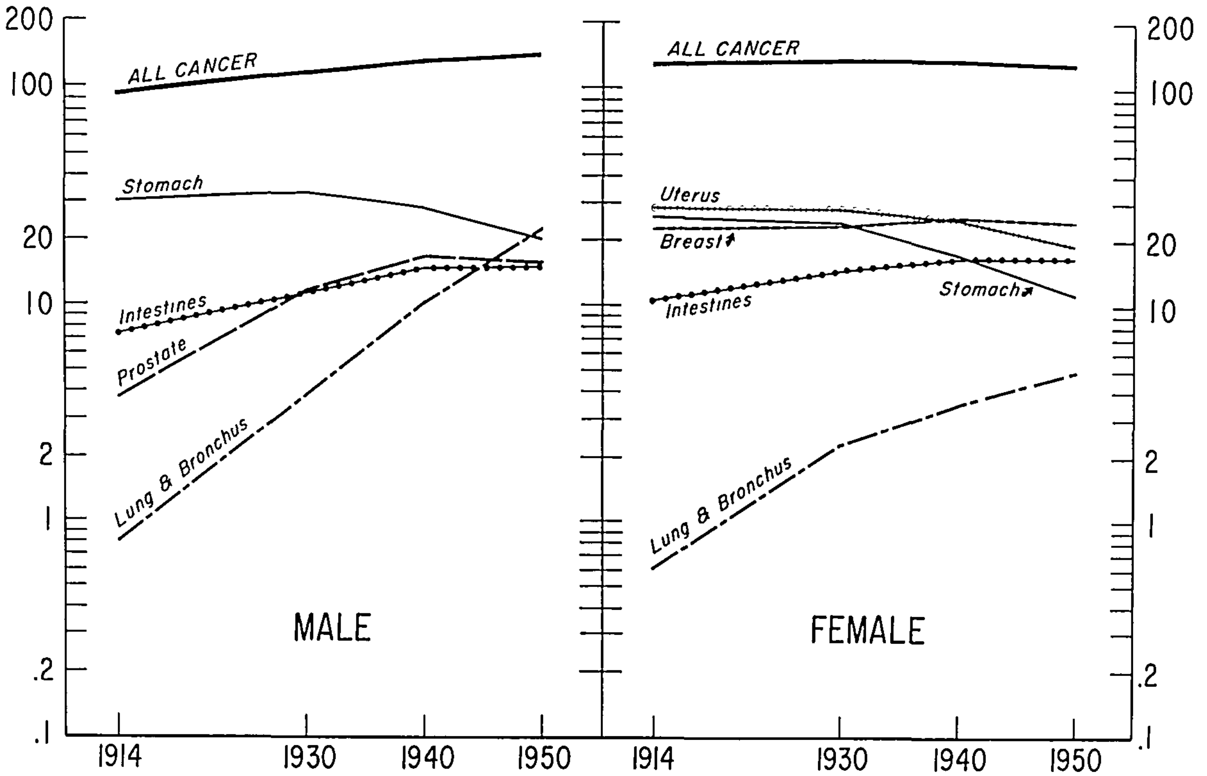

Fig. 2.—Total cancer death rate and death rate of cancer from selected sites, white persons, 1914-1950. The data are age-adjusted on the basis of the United States population in 1950.

list numbers in the Sixth Revision of the International Lists of Diseases and Causes of Deaths, adopted in 1948. These include List No. 162, "Malignant Neoplasm of Trachea, and of Bronchus and Lung Specified as Primary," and No. 163, "Malignant Neoplasm of Lung and Bronchus, Unspecified as to Whether Primary or Secondary." Comparable categories have appeared in the International Lists since 1929, but only a few countries have published detailed data. A considerably larger number of countries have coded lung cancer deaths to the broader rubric of the respiratory system, which in the current International List consists of Numbers 160-165. In addition to cancer of the trachea, lung and bronchus, cancer of the respiratory tract includes cancer of the larynx and other respiratory organs.

Cancer of the respiratory system first appeared as a separate category in the International Lists of Causes of Death in 1929. A few countries — England and Wales, Scotland, Ireland, Switzerland, Australia and perhaps several others — have a series on deaths from respiratory cancer from the beginning of the century. Detailed data for the United States, except for a special tabulation for 1914, begin with the year 1930.

For purposes of broad international comparison, one must therefore be content with the data for cancer of the respiratory system covering only two of the century's five decades. Omitting countries like Germany, whose geographic area has changed drastically in the past twenty years, and countries for which corresponding population and mortality data are not available, one is limited to the cancer mortality rates for fourteen countries. Although not representative of the world as a whole, they include a large

TABLE 1.—*Death Rates for Cancer and Other Malignant Tumors and for Cancer of Respiratory System, by Sex: 14 Selected Countries, for Specified Periods**

Area and Year		*Cancer and Other Malignant Tumors*			*Cancer of Respiratory System*	
	Total	*Male*	*Female*	*Total*	*Male*	*Female*
England and Wales:						
1930-32	145.5	143.0	147.8	8.4	12.9	4.3
1951[1]	196.8	212.7	182.1	33.5	58.3	10.7
Scotland:						
1930-32	146.9	141.4	157.1	8.0	10.6	5.6
1951[1]	193.1	202.0	184.9	30.5	50.9	11.9
Finland:						
1936-38[2]	107.6	108.3	107.0	7.8[3]	13.6[3]	2.3[3]
1951	142.7	153.6	132.8	21.5	38.0	6.5
Switzerland:						
1929-31	146.9	155.6	139.7	6.8	12.0	2.0
1951	192.1	204.7	180.1	19.3	33.8	5.5
Netherlands:						
1929-31	121.7	117.7	125.7	4.7	7.2	2.2
1951	148.4	150.6	146.3	17.3	29.7	5.1
New Zealand:[4]						
1930-32	101.9	103.3	100.5	4.9	7.1	2.5
1951	155.5	160.7	150.3	15.6	25.3	5.8
United States:						
1929-31[5]	97.4	86.3	108.8	3.1	4.3	1.9
1951[1]	140.5	145.1	136.1	14.7	24.4	5.2
Denmark:[6]						
1934-36[2]	146.6	131.7	161.0	3.5[3]	4.5[3]	2.5[3]
1951	176.9	168.3	185.5	13.2	21.1	5.4
Union of South Africa:[7]						
1935-37	100.2	102.6	97.7	4.6	7.2	1.9
1949-51	119.6	125.1	114.1	12.4	19.3	5.5
Ireland (Republic):						
1935-37	121.3	129.1	113.2	4.3	5.4	3.2
1951	149.4	161.0	137.5	12.9	18.7	6.9
Australia:[8]						
1932-34	105.2	109.1	101.2	4.4	6.3	2.3
1951	125.9	129.5	122.4	11.6	18.6	4.5
Canada:[9]						
1930-32	92.9	87.9	98.2	3.2	4.2	2.0
1951	127.4	131.4	123.4	11.3	18.2	4.3
Italy:						
1931	73.7	71.8	75.5	2.2	3.0	1.4
1951	113.8	118.5	109.4	9.3	14.6	4.2
Norway:						
1929-31[2]	122.3	117.6	126.7	1.5[3]	1.8[3]	1.2[3]
1951	158.4	154.8	162.0	7.4	10.2	4.6

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[1] Excluding deaths among armed forces outside country. Rates based on population excluding armed forces outside country.

[2] Deaths classified according to the Inter-Scandinavian List.

[3] Larynx and lung only.

[4] Excluding Maoris.

[5] Excluding the State of Texas.

[6] Excluding Faroe Islands.

[7] European population.

[8] Excluding full-blooded aborigines.

[9] Excluding Yukon and Northwest Territories; and for 1930-32, excluding Newfoundland also.

Source: Rates were computed by the National Office of Vital Statistics. Basic data were obtained from published reports and records of the World Health Organization and from Demographic Yearbooks of the United Nations.

*Countries are in rank order according to magnitude of death rate for cancer of male respiratory system in 1951. Rates per 100,000 population. Unless otherwise specified, deaths are classified cording to the International Lists of Causes of Death.

part of the so-called Western World.

The crude rates shown in Table 1 and Figure 1 were computed from mortality and population data provided by the United Nations and the World Health Organization in Geneva, supplemented in some cases by official national publications. To eliminate the effects of the different age-compositions of the populations from one period to another and among the fourteen countries, the rates should be adjusted according to a single standardized population. In most countries this would reduce, to some extent, the amount of increase; in the United States, for example, one-sixth of the increase of respiratory cancer in men may be attributed to the general aging of the population. Despite their limitations, however, the data are meaningful, and undoubtedly show that the recorded increase in respiratory cancer is a widespread phenomenon. It is also clear that the rates for respiratory cancer in men have been rising much more rapidly than have those for cancer in general. While the rates for cancer in general have increased by about a third, the rates for respiratory cancer have doubled, tripled and even quadrupled.

As a result, in all the countries included in Figure 1, cancer of the respiratory tract now accounts for a much greater proportion of all cancer deaths among men than was recorded in the early 1930's. In the three countries with the highest rates, the proportion of deaths from cancer of the respiratory tract advanced from about one-tenth of the total to about one-quarter. In several others, this type of cancer now accounts for about a fifth of the total.

The bars measuring total cancer rates are not very different for men and women, though in all countries except Australia the rates have advanced much more for men than for women.

The 1951 rates for cancer of the respiratory tract in women are surprisingly uniform; except in England and Wales and Scotland, they fall within the narrow range of 4 to 7 deaths per 100,000 of population. The rates for men show extreme variation, ranging from 10 deaths per 100,000 of population in Norway to 58 in England and Wales.

The rates for cancer of the respiratory tract in women have increased in all countries, but nowhere by more than 6 deaths per 100,000 of population. Whether these moderate increases are due entirely to diagnostic improvements or to some extent reflect an actual increase in mortality cannot be determined from the data.

In all the countries except Finland, Switzerland and the Union of South

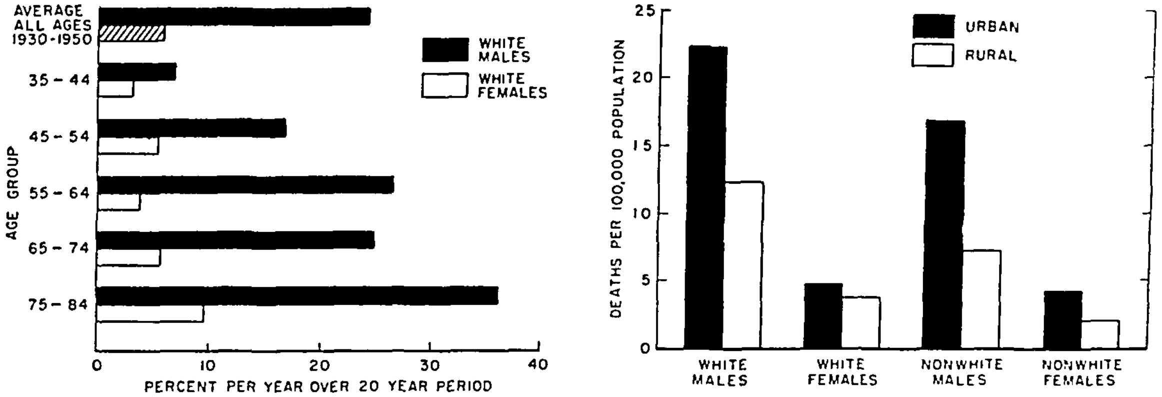

Fig. 3.—*Left,* average annual percentile increase in death rates for cancer of the lung in white persons, classified by age groups, 1930-1950. *Right,* death rates for cancer of the lung in urban and rural residence, 1948-1949, age-adjusted on the basis of the United States population in 1950.

Africa, where the male-female relation rates has remained unchanged, the disproportionate increase of the rates for respiratory cancer in men has accentuated the difference in the rates for men and women (Table 2).

TABLE 2.—*Ratio of Male to Female with Regard to Death Rates from Cancer of the Respiratory Tract*

	*Early 1930's**	*1951*
England and Wales	3.0:1	5.4:1
Scotland	1.9:1	4.3:1
Finland	5.9:1	5.8:1
Switzerland	6.0:1	6.1:1
Netherlands	3.3:1	5.8:1
New Zealand	2.8:1	4.4:1
United States	2.3:1	4.7:1
Denmark	1.8:1	3.9:1
Union of South Africa	3.8:1	3.5:1
Ireland (Republic)	1.7:1	2.7:1
Australia	2.7:1	4.1:1
Canada	2.1:1	4.2:1
Italy	2.1:1	3.5:1
Norway	1.5:1	2.2:1

*The years correspond to those shown in Table 1.

With all due regard for the limitations of the data, the reported experience of the fourteen countries would seem to justify a few broad generalizations. Cancer of the respiratory tract has increased far more in some countries than in others. In all the countries considered, it has increased substantially more in men than in women, and in all but three of the countries the preponderance of male over female has also increased.

Without more detailed data, and without *familiarity with the diagnostic and* reporting practices in each of the countries, it would be presumptuous to comment on the international differences. But within any country where the rates for men and women have increased disproportionately, it is illogical to attribute such increases to better case-finding and diagnosis, since improvements of this type would apply to both sexes.

The crude data on the respiratory tract include lung cancer components that may vary in magnitude from country to country and from one period to another. The behavior of lung cancer itself can be observed best in countries that meet the following criteria over a long-term period: an established death registration system with virtually complete reporting of deaths by detailed cause; a geographically stabilized death registration area; general availability of well-trained physicians and adequate diagnostic facilities; and reliable population counts or estimates by sex and age group, for the computation of age-adjusted and age-specific death rates. Only a few countries meet these criteria in full and have published sufficient data to permit adequate analysis.

To bring out certain significant aspects of lung cancer in the twentieth century, the United States mortality experience will be discussed in some detail. The British and Danish material will be presented more briefly.

To appreciate the steepness of the rise in incidence of lung cancer in the male in the United States, it should be contrasted with the moderate changes that have characterized other cancer rates in the same period (Fig. 2). From 1914 to 1950 the combined death rate for all forms of cancer in men rose from 91.5 to 147.7 per 100,000 of population, an increase of 61 per cent. The combined cancer death rates in women have been much more stable. From 131.6 in 1914, the total cancer death rate in women showed a moderate rise to 142.6 in 1935, which to a great extent probably reflected better reporting. Then the rate tapered off to 132.5 by 1950, almost to the same level as in 1914. Part of this drop was undoubtedly due to actual progress in cancer therapy. In 1914 the combined cancer rate for men was considerably below the rate for women, but about 1945 it overtook the rate for women, and by 1950 it was 11 per cent higher.

Mortality from lung cancer among women, despite a fairly sharp increase

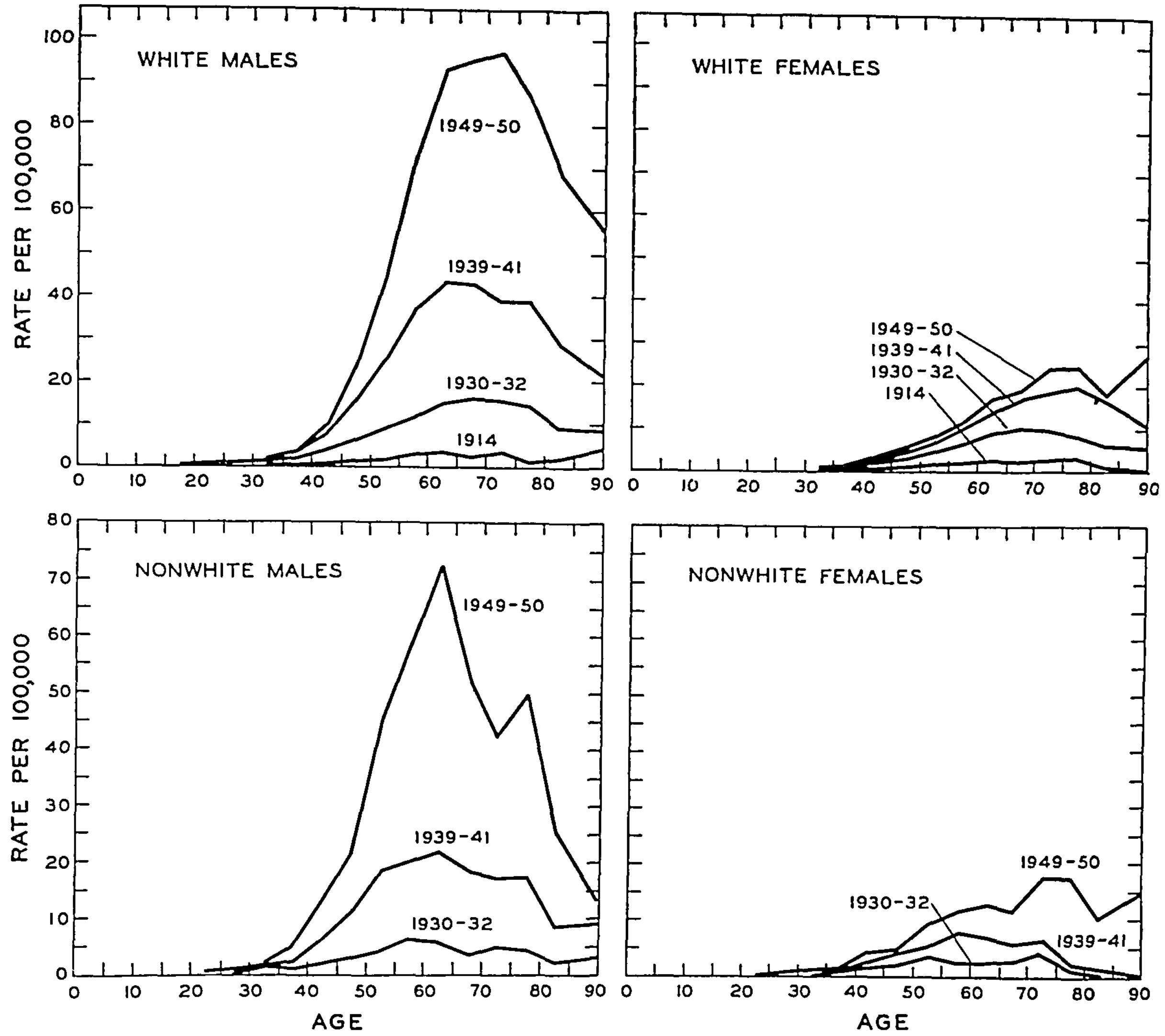

Fig. 4.—Death rates for cancer of the lung, in the United States, selected years 1914-1950, classified by age, sex and race.

since 1914, was still low in 1950 compared with the mortality from cancer of the major sites. The mortality rate for mammary cancer, which remained constant over the years, was still nearly six times as great. The rate for cancer of the stomach, after falling more than 50 per cent, was two and one-half times that for lung cancer. Part of the drop in mortality from gastric cancer in both men and women can be attributed to more precise diagnoses of intestinal cancer.

The curves for lung cancer rates for men and women seem to have little in common. In 1914, for whatever the figures are worth, lung cancer showed virtually no sex preference. Then the two curves began to pull apart, and by 1950 the death rate for men was about four and one-half times the rate for women. The rate of increase—which shows up very clearly on the semilogarithmic scale — is altogether different for the two sexes. Since 1914 the death rate for women has increased eight times, the rate for men twenty-seven and one-half times. If one discounts the earlier figures because of admitted defects in diagnosis and reporting, one may limit

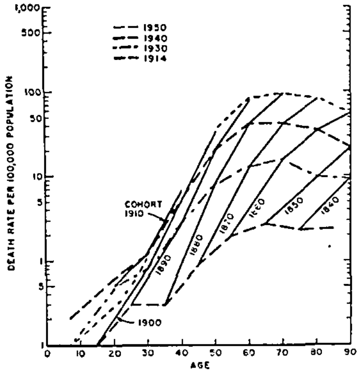

Fig. 5.—Death rates for cancer of the lung in white male persons, United States, selected years 1914-1950. Calendar year rates and cohort rates are given.

one's attention for a moment to the experience of the past ten years. In 1940, the rate for men was less than three times the rate for women; by 1950, it was four and one-half times. From 1940 to 1950, the death rate for women advanced from 3.5 to 4.9 per 100,000, an increase of 40 per cent. During the same decade, the rate for men rose from 10.1 to 22, a relative increase of three times as much.

Although mortality statistics should not be taken at face value, the differences between the lung cancer curves for the two sexes are hard to explain away. If one insists that the recorded rise of the incidence in men is an artifact, that there was just as much lung cancer in 1914 as in 1950 but that physicians failed to detect it, one must accept the incredible: that 96 cases of lung cancer were missed for every 4 diagnosed. (The 1914 lung cancer rate for the male was only 3.7 per cent of the 1950 rate.) Compared with 1914, an additional 21.2 deaths from lung cancer per 100,000 men were reported in 1950, but only 4.3 additional deaths per 100,000 women. If one rejects both these increases as artifacts due to better diagnosis, one must suppose that medical skill in diagnosing lung cancer has improved five times as much for men as for women.

Figure 3 *(left)* does not deal with the magnitude of the death rates for any age group but only with the relative amount of increase in the rates for each group. If a rate for any age group were very low at the start, a small absolute increase would produce a large relative increase. In order to confine our analysis to the more reliable segment of the data, the 1914-1930 experience has been omitted.

Over the twenty-year period, the percentage of increase varies widely among men of different age groups but relatively little among women. If there were much truth in the contention that the recorded rise merely reflects better diagnosis and reporting, it would be reasonable to expect the percentile increases by sex and age to show some variation, but not too much. This is, in fact, what one does find in the percentage increases among women of the different age groups. The average increase for lung cancer in all women was 5.6 per cent a year; the group aged 35 to 44, with the smallest increase, varied from this by less than three percentage points, and the group with the largest increase, aged 75 to 84, by only 4 percentage points.* This is the kind of variation that might be due to chance factors, with physicians applying their growing diagnostic skill to all women, regardless of age.

But the bars that show the rate of increase of lung cancer in men of different age groups vary from one end of the chart to the other. For men as a whole, the increase averaged 24 per cent a year. For men in the younger group the average rate of increase was only 6.7 per cent a year, or more than seventeen points below. But for men aged 75 to 84 the increase reached the astonishing annual average of 36.2 per cent — a spread of nearly thirty points between the percentile increases of lung cancer for the two groups. If these relative increases were due solely to improved means of diagnosis, it would mean that the medical facilities available to one age group had improved nearly five and one-half times as much during the twenty years as had those available to another age group.

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*"Average annual increase," i.e., one-twentieth of the percentile increase during the [illegible] 30 [illegible] simplicity, the compounding factor

As a more rational explanation, with all due regard for chance factors, it seems probable that lung cancer actually did increase at a faster rate in some age groups than in others. This is an additional piece of evidence that at least some of the increase of lung cancer in the twentieth century is real. Physicians are encountering more lung cancer not only because they are better diagnosticians but because there is actually more to find.

How much more? What proportion of the recorded increase reflects a greater occurrence of the disease? Clemmesen in Denmark and Levin in New York State have suggested that since diagnostic improvements are available on an equal basis to both men and women, the increase of lung cancer rates in women might be regarded as a "control" to measure the amount of increase resulting from improved diagnosis. This assumes, of course, that none of the increase of lung cancer in women is real.

During the 20-year period shown in

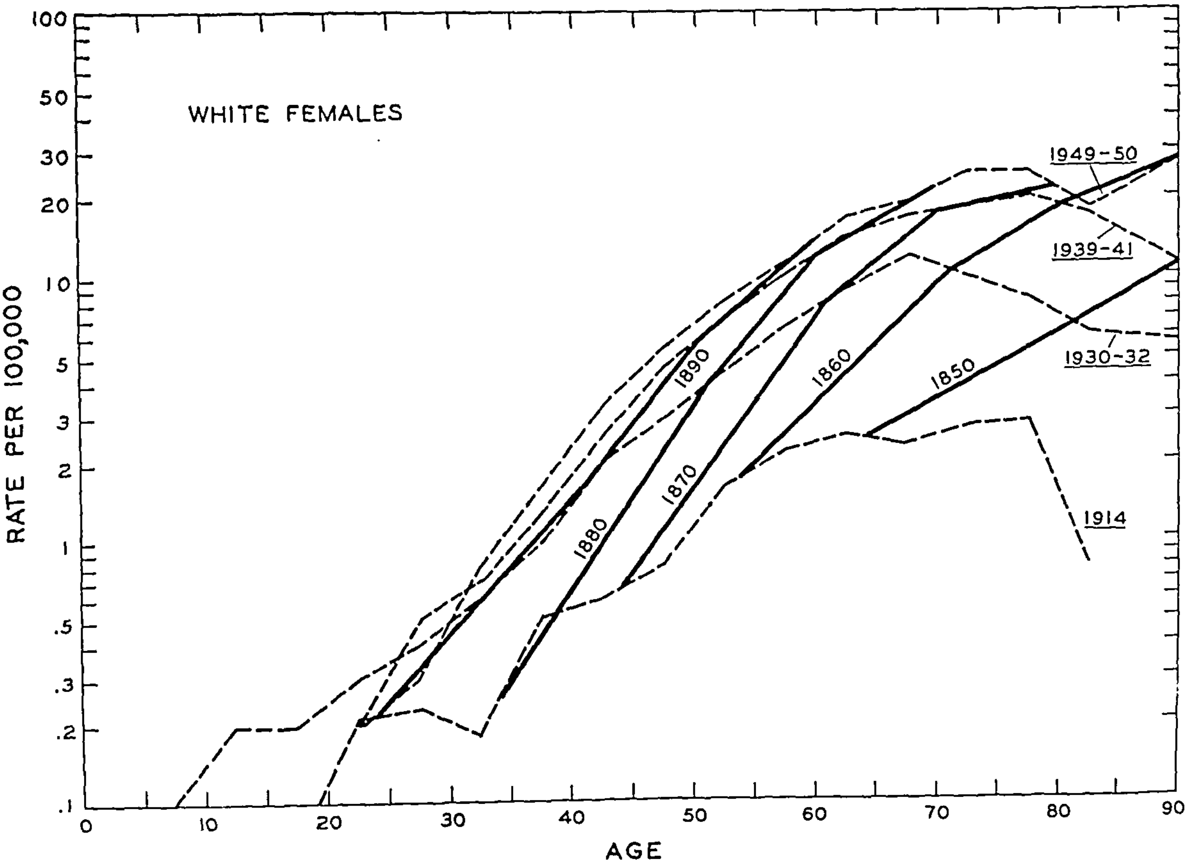

Fig. 6.—Death rates for cancer of the lung in white female persons, United States, selected years 1914-1950. Calendar year rates and cohort rates are given.

Figure 3 (*left*), lung cancer rates in women increased by 113 per cent, and in men by 479 per cent. By subtraction, this would suggest a real increase of 366 per cent, or more than 18 per cent a year. Since the total increase of lung cancer rates for men averaged 24 per cent a year, as shown on the chart, it appears that at least three-quarters of the increase in rates cannot be accounted for by improvements in diagnosis and reporting.

Using data for the years 1930 to 1932, Mary Gover[5] was the first investigator to point out that death rates for cancer of the respiratory system and cancer of several other sites are highest in states with the greatest proportion of people living in urban areas. The allocation shown here is based on material recently developed by Hoffman and Gilliam,[6] who followed the 1940 census definition of urban as incorporated places of 2,500 or more population (Fig. 3, *right*). As to the differences in the urban-rural lung cancer rates, Hoffman and Gilliam stated: "It is not possible with data presently available here or elsewhere to determine whether they are due to occupational, environmental, economic, diagnostic or other factors . . ."

But apart from the reasons, the differences themselves are of considerable interest. For men living in urban areas the lung cancer rates are about twice as high as are those for men in rural areas, but place of residence has relatively little effect on the amount of recorded lung cancer in women. If the urban-rural differences were due solely to better diagnosis and reporting of lung cancer in the urban areas, they should be approximately similar for men and women. The suggestion that excessive lung cancer in urban areas might be due to atmospheric carcinogens is open to the same objection. It is interesting to note that nonwhite men breathing the pure air of the countryside show a considerably higher incidence of lung cancer than do white women who are exposed to the polluted air of towns and cities. Since the diagnostic facilities available to urban white women are undoubtedly superior to those available to rural nonwhite men, the higher rates for the latter suggest that more of them actually do have lung cancer and that this excess is due to constitutional or environmental factors other than atmospheric pollution.

The urban-rural differences in lung cancer death rates are confirmed by an intensive state-wide study of cancer morbidity, which was made in Iowa in 1950 and is now in process of analysis by Haenszel.[7] In this study, deaths from cancer of the lung and of other sites were allocated to urban and rural populations within metropolitan and nonmetropolitan areas. The urban populations showed two to three times as much lung cancer as did the rural populations; for cancer in other sites, the urban-rural differences were relatively small.

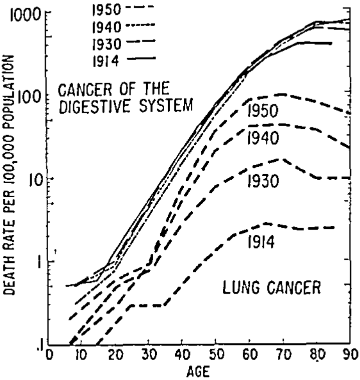

Fig. 7.—Death rates for cancer of the digestive system and of the lung in white male persons, United States, selected years 1914-1950, classified by age.

In the Iowa study, it is particularly difficult to ascribe the urban-rural differences to superior diagnostic facilities in the metropolitan areas. The rates for the rural populations close to the large cities were as low as for the rural populations in nonmetropolitan areas. Moreover, the usual indicators of the diagnostic level — percentage of diagnoses confirmed microscopically, percentage reported from hospitals, percentages reported at various stages of the disease and percentages surviving for designated periods — all were practically identical for the urban and the rural population.

Many factors have been suggested to account for the difference between the respective frequency of lung cancer in urban and rural men, but none of them has won general acceptance. As to the difference itself, however, in the absence of contrary evidence, one can accept most of it as a real difference in urban and rural incidence of the disease.

In the next chart (Fig. 4), which presents the actual lung cancer mortality rates for men and women by age for several selected calendar years, let us first examine the four curves for 1949 to 1950. Up to the age of 40 the disease is rare in

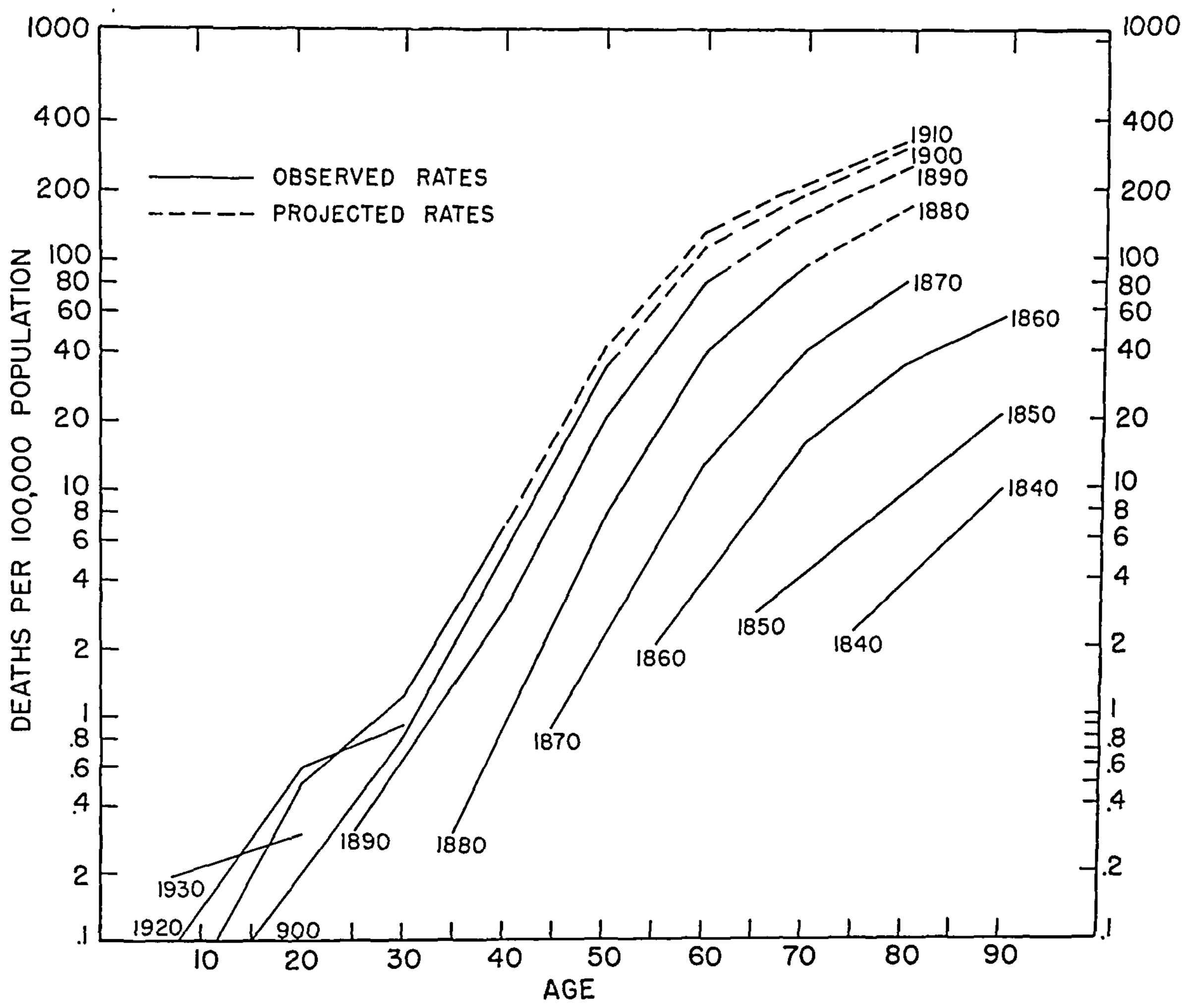

Fig. 8.—Death rates for cancer of the lung in the United States, for cohorts 1840-1910; future years projected.

both sexes. After that age, among white men, the mortality curve mounts in an almost vertical line until it reaches a peak between the ages of 70 and 74. Among white men aged 35 to 39 there are 4 deaths per 100,000; this rate rises by the age of 70 to 74 to 97 per 100,000—an increase of some 2,300 per cent. In the age group of peak mortality, the rate for white men is four times the rate for white women.

The 1949-1950 curve illustrates another peculiar sex difference. For white women, except for a small decline between the ages of 80 and 85, the mortality curve rises throughout the life span; but the mortality curves for men are strikingly different. Instead of rising throughout the life span, the curve for white men suddenly changes direction after the age of 70. From then on, the mortality rates of lung cancer fall almost as sharply as they rose before the age of 70. The curve for nonwhite men changes direction after the age of 60.

Recent data on cancer illness, based on surveys in 10 metropolitan areas in 1947 or 1948, corroborate the mortality data in all essential features: the incidence curves for men and women show the same contrast as do the mortality curves.[8]

Comparing the 1949-1950 curves with those for earlier years, it appears that the extreme dip is of fairly recent origin (Fig. 4). The first faint traces of it appear in 1930, and do not become obvious until 1940. By 1950, for both the white and the nonwhite population, the general contours of the age-rate curves for men and those for women have almost nothing in common, and in the older groups they point in opposite directions.

A remote possibility is that census population counts and both mortality and morbidity records may be less reliable for older men and may even show the reverse of what actually occurs. If the recorded drop after the age of 70 were small, this might be a plausible explanation. But the magnitude of the decline—amounting to more than 40 per cent for white men—argues against it. And why should the rates collapse for elderly men but not for elderly women?

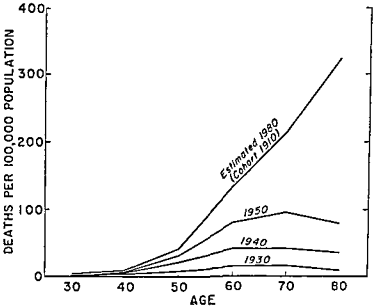

Fig. 9.—Death rates for cancer of the lung in white male persons, United States, 1930, 1940, 1950 and estimated 1980, according to age.

To explain why the rates for men have been lower after the age of 70, and to understand how this peculiar phenomenon relates to the past and future of mortality from lung cancer, one must look at the rates in two different ways (Fig. 5). The calendar-year curves, which are shown in the broken lines, are familiar. Each of these represents the death rates by age for all the white male patients who died of lung cancer during a single calendar year, computed from the number of deaths in each age group and the population of men in the same age group.

Each calendar-year curve shows the death rates in a single year for men in various age groups that were born at different times. For example, the deaths at the age of 90 that occurred in 1950 occurred in a group of persons born about 1860; the deaths at the age of 70 occurred in a group of persons born about 1880, and so on. What would happen if one were to look at the death rates for each of these groups separately, not merely in 1950 but starting with each group when its members were young and following their group mortality experience from year to year?

This is the cohort concept, which was first applied to lung cancer by Korteweg[9] in 1951. The idea of the cohort is a simple one that everyone uses every day. When each American adult was a child about six years old, he was enrolled in primary school with a group of other youngsters of about the same age; all through the United States, other youngsters of about the same age were also just starting school. Later, the members of this group entered secondary school at about the same time, and some of them ultimately became his classmates in college. This cohort has been steadily diminished by deaths of its members from one cause or another; if one wished, one could plot the yearly death rates for the cohort, for all causes or for any specific cause, from the year of the cohort's birth to the present time.

Given the calendar-year rates for lung cancer from 1914 to 1950, it is a simple matter to plot the death rates for at least part of the life of each cohort. Unfortunately, the data do not go back far enough to permit one to plot cohort rates for the entire life span of the older cohorts. The rates for the younger cohorts lie partly in the future.

Let us concentrate for the moment on the cohort born about 1860. In 1950 the members of this group were about 90 years old; they were about 80 years old in 1940, about 70 in 1930 and about 54 in 1914. The point on the 1950 calendar-year curve that indicates the age of 90 may also be regarded as the death rate for the 1860 cohort at this age. In 1940 this cohort was ten years younger, or aged 80; by connecting this point on the 1940 curve with the point for the age of 90 on the 1950 curve, one approximates the experience of the 1860 cohort with lung cancer between 1940 and 1950. The solid line is continued to the seventieth year on the 1930 curve and to the fifty-fourth year on the 1914 curve. The entire solid line represents the experience of the 1860 cohort with regard to cancer of the lung between 1914 and 1950, from the age of 54 to about the age of 90. Similarly, the appropriate points can be connected to show a portion of the death rates from this disease for each of the other cohorts.

Looking now at the cohort curves (the solid lines), the first thing to note is that death rates from lung cancer increase continuously for all the cohorts. The drop in the death rates after the age of 70, as shown in the calendar-year curves, completely disappears.

Second, comparing the rates for any two cohorts at the same age, note that the younger cohort shows the higher age-specific death rate. Another way of saying the same thing is that the more recent cohort reaches a specified death rate at an earlier chronologic age.

It may be taken as virtually certain that in 1960, when the 1890 cohort reaches the age of 70, its death rate from lung cancer will be higher than for any of the earlier cohorts at the age of 70. Similarly, the rate for the 1900 cohort at the age of 70—in 1970—will be higher than for the 1890 cohort.

Comparison of the cohort and calendar-year curves suggests that the factor or factors responsible for the increase in pulmonary cancer affected the younger generations at an earlier chronologic age than that at which the older generations were affected. As the older generations who were less affected by the cancerigenic agent or agents drop out of the population, the present decline in calendar-year death rates after the age of 70 will tend to disappear. In some future calendar year one may expect the lung cancer curve, like the curves for other major cancer sites, to rise throughout the whole of life. Barring some dramatic improvement in cancer treatment, the total death rate for this disease must inevitably mount.

In Figure 5 I have used a logarithmic scale in order to bring out the changes in the rate of increase. Look again at the four broken lines that present the rates for each age for the calendar years 1914, 1930, 1940 and 1950. As one moves from the earlier calendar-year curves to the more recent ones, the vertical distance between the curves shows marked decreases. As one looks at the cohort curves, the horizontal distances decrease as one moves from the older cohorts to the more recent ones. The distance between the 1900 and 1910 cohorts, at the left side of the chart, has become quite narrow. Both sets of curves indicate that, although cancer of the lung has continued to increase, the rate of increase has been slowing down. This may suggest that forecasts of future mortality rates that project present experience at a uniform rate of increase may exaggerate the danger.

A similar chart (Fig. 6) presents the calendar-year curves (the broken lines) and the cohort curves (the solid lines) that show the increase of lung cancer in women. Compared with the data for men, the rates and the increases for women are moderate.

It is widely believed that the spectacular increases of the incidence of lung cancer rates in men will eventually be repeated in the women, presumably on the hypothesis that the carcinogenic agent or agents that affected the men may not have begun to affect women until a later date. Although this chart does not discredit the hypothesis, it does not support it. The diminishing rate of increase is already quite evident. The distance between the cohort lines has substantially narrowed; if the curves for cohorts 1900 and 1910 were plotted, they would be very close together, suggesting that the rates for women have been fairly static in recent years. Unfortunately, the data are too scanty to provide much assurance that the rates are already becoming stabilized.

By way of contrast with the calendar-year incidence of lung cancer for men, the curves for cancer of the digestive system are quite stable from one decade to another (Fig. 7). This is typical of the chronic diseases, and for any other disease that has had a stable incidence for a long time. In old age the rates level off but show no decline. If the cohort lines were plotted for cancer of the digestive system they would be very close together, and in contour would resemble the calendar-year curves.

The solid lines in Figure 8 show the death rates from lung cancer for the various cohorts; the broken lines project these rates for the younger cohorts up to the age of 80, on the assumption of a decreasing rate of increase. The shape of the curves suggests that the age-specific rates may become stabilized approximately at the levels observed and estimated for the cohort born about 1910. If that is true, the rates for the 1910 cohort will be applicable to all age groups in calendar year 1980.

Figure 8, like the previous charts for cohorts, is plotted on a semilogarithmic scale in order to show the relative increases in the incidence of lung cancer. Figure 9 goes back to an arithmetic scale, in order to show what the projected increase looks like in absolute terms. The calendar-year rates are actual, and the estimates for the 1910 cohort roughly approximate the age-specific rates to be expected in calendar year 1980. Even if no further increases occur, over and above the rates estimated for the 1910 cohort the increase in mortality from lung cancer will be very considerable. If I am wrong in-assuming that the rates for this cohort will be stabilized, the probability is that the rates for calendar years 1980 and after will go higher, not lower.

To approximate the number of deaths from lung cancer that may be expected in 1980, one can apply the age-specific rates for the 1910 cohort to the male population expected. Extending the minimum male population projection of the Census Bureau to 1980 (101,872,000) and allowing for no substantial improvements in therapy, approximately 39,000 men in the United States may be expected to die of ung cancer in 1980, as compared with 15,600 in 1950. This estimate includes the nonwhite population, since a separate proection for the white male is not available.

Examination of the data of other countries—particularly England and Wales and Denmark—confirms the patterns observed n the United States. In England and Wales the rate for men in 1952 was two and one-third times the rate in the United States; the rate for women was not quite twice as high as in the United States. By 1947 the British medical profession was alert to the problem, and it is doubtful that any substantial proportion of deaths from lung cancer was undiagnosed. In that year, the crude rate for men per 100,000 population was 38.7; by 1950 it had umped to 48.5, and by 1952 to 56.8. Durng that brief period there has been no radical improvement in diagnosis and medical facilities. It would be folly to attribute the enormous increases in cancer of the lung in England and Wales since 1947 to anything but a real increase in the disease itself. Stocks,[10] Doll,[4] and Kennaway and Waller[11] have reviewed the Britsh data in detail.

The Danish material on lung cancer is particularly valuable, and has been ably presented by Clemmesen and his associates. Denmark is a small, compact country with a well delimited population. Its medical facilities are of high quality and are accessible to all social strata. The mortality data are unusually good and are reinforced by morbidity records from the Danish Cancer Registry, and indirectly by the records of the Central Tuberculosis Station of the City of Copenhagen, where cancer of the lung is discovered as a by-product in detecting tuberculosis.

The differences in increases of the rates in men and in women have been strikingly disproportionate. No possible change in diagnostic procedure between 1931 and 1950 could increase the rate for men in Copenhagen from 4.5 to 36.9 while it increased the rate in women only from 3.7 to 5.3. Since 1943, over a period when the percentage of hospitalized patients and the percentage of diagnoses verified by histologic or postmortem examination have remained constant, the Danish Cancer Registry has reported increases in lung cancer that correspond very closely to the mortality figures. In 1953, reexamination of material from the tuberculosis station, to which physicians refer all cases of thoracic disease, showed the three sets of figures to be in very close proximation. Clemmesen concludes, on the basis of probably the most careful study of any city in the world, "There is a steep real increase in incidence of pulmonary carcinoma among males amounting to about 12 per cent yearly, which is independent of progress in diagnostic technique and medical attention."[12]

By 1990, Clemmesen forecasts for the City of Copenhagen a fivefold increase in male deaths from lung cancer, with a corresponding increase, after a delay of about one decade, in provincial towns and rural areas. Although this forecast seems to me excessive, time may confirm his statement, "It seems impossible to escape the conclusion from the studies reported that we are now facing the beginning of one of the major catastrophes in medical history."[13]

To a varying extent, the statement is applicable to England and Wales, the United States and a number of other countries.

SUMMARY

1. The increase in cancer of the lung in men is much greater than for women.

2. The increases in the rates for lung cancer in men vary considerably for different age groups.

3. These differences cannot be explained substantially through improvement of cancer diagnostic facilities.

4. These increases and differences exist in many parts of the world.

ZUSAMMENFASSUNG

1. Die Zunahme des Lungenkrebses ist bei Maennern groesser als bei Frauen.

2. Die Zunahme der Haeufigkeit bei Maennern weist in verschiedenen Altersgruppen erhebliche Schwankungen auf.

3. Diese Unterschiede lassen sich nicht wesentlich durch die Verbesserung des diagnostischen Ruestzeuges zur Krebserkennung erklaeren.

4. Die Zunahme des Lungenkrebses und die angegebenen Unterschiede bestehen in der ganzen Welt.

SUMARIO

1. O aumento da incidência do câncer do pulmão no homem é muito maior do que na mulher.

2. O aumento de incidência no homem varia consideràvelmente em diferentes grupos de idade.

3. Essas diferenças não podem ser explicadas substâncialmente, apezar de melhoria dos meios de diagnóstico para o câncer.

4. Éste aumento e essa diferença existem em todo o mundo.

RIASSUNTO

1. La frequenza del cancro polmonare cresce più fra gli uomini che fra le donne.

2. L'aumento della frequenza è diverso nelle varie età.

3. Queste differenze non si possono interpretare.

4. Esse sono state constatate ovunque.

RÉSUMÉ

1. L'augmentation du cancer du poumon chez l'homme est beaucoup plus importante que chez la femme.

2. L'augmentation de la fréquence chez l'homme varie considérablement suivant l'âge.

3. Ces variations ne peuvent pas être expliquées par la seule amélioration des moyens de diagnostic.

4. Cette augmentation et ces différences existent dans le monde entier.

RESUMEN

1. El aumento del cancer pulmonar en el hombre esmayor que en la mujer.

2. El aumento de incidencia en el hombre varía considerablemente según la edad.

3. Estas diferencias no pueden explicarse a través de la mejoría de facilidades diagnósticas del cancer.

4. Estos aumentos y diferencias existen en todo el mundo.

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The empty vessel giveth a greater sound than the full barrel.

—*Lyly*

Self-complacency is pleasure accompanied by the idea of oneself as cause.

—*Spinoza*

Every occasion will catch the senses of the vain man, and with that bridle and saddle you may ride him.

—*Sidney*

I've never any pity for conceited people, because I think they carry their comfort about with them.

—*Eliot*

The worst cliques are those which consist of one man.

—*Shaw*

To love oneself is the beginning of a lifelong romance.

—*Wilde*

And so we plough along, as the fly said to the ox.

—*Longfellow*

Anorectal Melanosarcoma Arising in a Hypertrophied Papilla

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ANORECTAL melanosarcoma is a rare and highly malignant tumor. Raven[1] called it the most virulent of all known tumors and said, "Its appearance is a sign of death, unless radical surgery is instituted in the early days of its development." Hippocrates recognized and described the pigmented nevus, and in 1806 Lannec first used the term "melanotic" in describing it. It was not, however, until 1857 that the first melanoma of the rectum was reported. Chalier and Bonnet[2] in 1913 wrote the first comprehensive paper on the subject. They collected and analyzed 64 cases. Additional cases have since been added. In 1952, Weston and Marren[3] reviewed the literature and brought the list of cases up to date by adding one of their own. Thus, in almost one hundred years, only 93 cases of anorectal malignant melanoma have been reported.

Chalier and Bonnet[2] estimated that anorectal malignant melanomas form 2 to 3 per cent of all melanotic growths in the body. A similar observation was that of Allen and Spitz[4] of 2.5 per cent in 1953. Raven[1] cited Miles as having found only 3 cases of malignant anorectal melanoma in over 1,500 cases of malignant tumor of the rectum.

The site of the anorectal lesions has varied. Behrend and Behrend[5] reported a case of melanosarcoma arising at the rectosigmoid juncture. In 1 of the 3 cases of Kallet and Saltzstein[6] it occurred in a rectal polyp, while in the case of Weston and Marren[3] it apparently had its origin 8 cm. from the anal orifice. In the majority of the other reported cases the tumors were located in the anal canal. The posterior wall of the canal is the usual site, followed by the lateral walls, the anterior wall being least frequently involved. So far as I know, my case is the first to be reported of the tumor arising in a hypertrophied papilla. The size of the reported lesions has varied; they range from a miliary nodule to a large tumor involving a considerable portion of the rectum. The tumors have been both sessile and pedunculated. The peak of the age incidence for melanosarcoma is no different from that for malignant tumors of other types, and the incidence is almost identical in the male and in the female.

Diagnosis.—There are no symptoms characteristic of anorectal malignant melanoma. The only physical abnormality may be the lesion, with its telltale discoloration. The final diagnosis is made by biopsy, operation or autopsy.

Theories of the origin of melanosarcoma are many, the two best-supported being that which ascribes it to a neural source and that which considers it epidermal. Allen[7] has ably supported the epidermal theory in a histologic study and review written in 1949. His theory would explain the majority of anorectal lesions, particularly those which arise at or below the anorectal line. There are three generally accepted modes of spread: 1. *By direct extension.* These lesions are prone to spread from the anal canal to the rectum along the submucous tissue. They also

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954

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spread by direct continuity through the perianal skin, making wide excision absolutely mandatory. 2. *By way of the lymphatics.* The lymphatic pathway followed is influenced by the level of the lesion; however, because of decussation of the intramural lymphatics, any of the three established pathways may be taken. The downward zone of spread involves the ilioinquinal glands, but both the lateral and the upper zone of spread may be utilized. The incidence of 87 per cent metastasis to the liver[8] demonstrates the frequency of the upward spread. 3. *By hematogenesis.* It is characteristic of melanosarcoma that it invades the blood vessels early. Thus, the metastatic lesions are often multiple and widespread. It is not uncommon to find the lung, skull, kidneys and spine all involved.

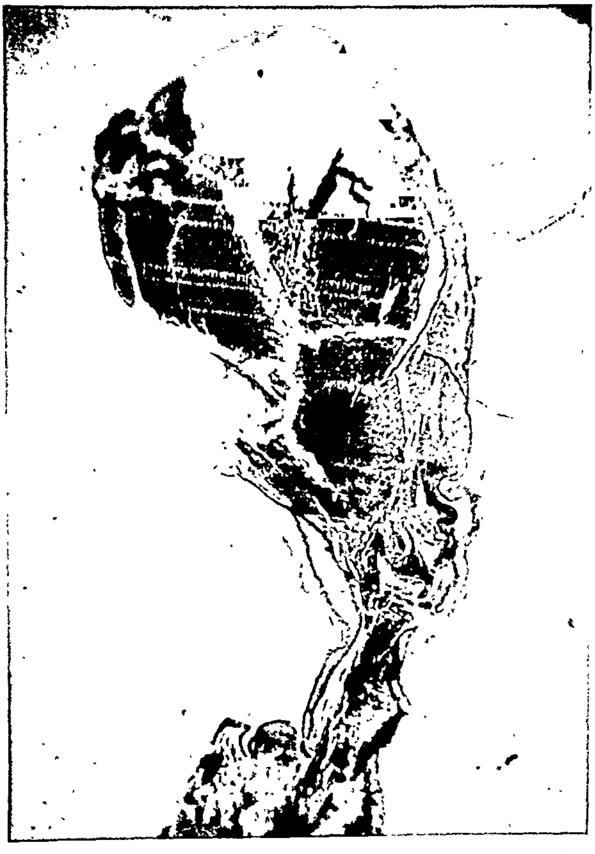

Fig. 1.—Section through the hypertrophied papillae, showing narrow base and discolored periphery.

Treatment.—All melanotic lesions should be regarded with both respect and suspicion. There are times when removal of the lesion for biopsy may be a major procedure. Certainly any melanotic lesion of the anal canal should be widely excised to include not only the concomitant perianal skin but the rectal mucosa above. Allen and Spitz,[4] in a complete review of 954 patients with malignant melanoma of all parts of the body, observed that a relatively high percentage (68.2 per cent) of patients who survived five years or longer were treated merely by local excisions of their primary tumors. Radical operation, however, is the treatment most widely accepted.[9] This usually consists of a Miles resection, followed in several weeks by a bilateral dissection of the inquinal nodes. Pack,[10] in treating malignant melanoma in other parts of the body, favors excision and dissection in continuity. This same principle must necessarily apply to lesions in the anal canal.

My case demonstrated how serious a small lesion can sometimes be.

REPORT OF CASE

A white woman aged 53 was first seen on Feb. 9, 1954, in my office. Her chief complaint at that time was of rectal protrusion, which she had noticed for about three weeks. There was some discomfort associated with the protrusion, but no bleeding was present. There was slight constipation, which did not require laxatives.

The history by systems was normal. Physical examination revealed her to be well nourished and somewhat overweight. Examination of the ears, nose, throat, heart and lungs revealed no abnormality. There were no palpable tumors in the abdomen. The liver was palpable at the costal margin, with no tenderness. Pelvic examination was not done when the patient was first seen in the office, but later gave negative results. Rectal examination revealed moderate stenosis. Digital examination revealed a hypertrophied papilla on a small pedicle located on the left midlateral wall. There were no tumors palpable in the ampulla of the rectum. With the removal of the examining finger the papilla followed and extended to the outside. An anoscope was admitted and the hypertrophied papilla demonstrated. It was noted at that time that the papilla was approximately 2 cm. in length and about 5 mm. in breadth at its widest portion. The base narrowed down to a very small pedicle, not more than 2 mm. in diameter. The most outstanding characteristic of the papilla was that the distal half showed bluish discoloration. The tip was soft. A sigmoidoscope was passed a distance of 25 cm. and no additional pathology was encountered. A diagnosis was made of a hypertrophied papilla and anal stenosis. Because of the unusual appearance and discoloration of the papilla the patient was advised to enter the hospital as soon as possible for excision of the lesion.

She was admitted to St. Mary's Hospital, Evansville on March 2. The routine laboratory tests were nonrevealing. A roentgenogram of the chest showed no pathologic change in the lungs. The patient was taken to the operating room on March 3. At that time the hypertrophied papilla, together with a wide area of skin and some mucosa above, was removed. The patient was returned to her room in good condition (Fig. 1).

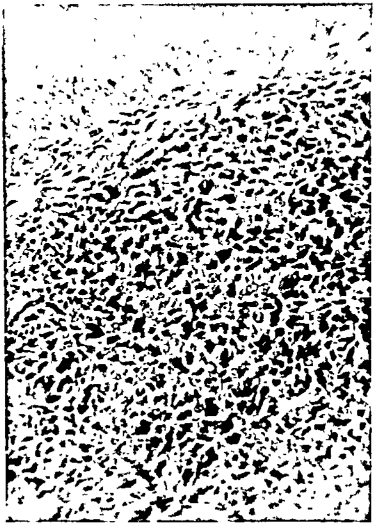
Fig. 2.—Microscopic picture of papillae, with demonstrable melanotic cells.

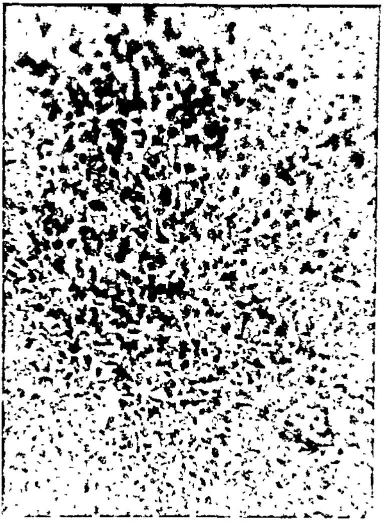
Fig. 3.—Biopsy specimen of liver, with metastatic melanomatous cells.

The pathologist reported a diagnosis of malignant melanoma of a hypertrophied papilla. His microscopic description was as follows: "The papilla contains, just beneath the epidermis, masses of polygonal and oval nonpigmented cells, among which there are some cells containing dark brown pigment granules, and this appearance extends to the narrow part of the stalk but is not present in the base. Diagnosis: Malignant melanoma of hypertrophied papilla." Fig. 2. The next day, he submitted a supplementary report because at that time, upon reexamination, he observed a small satellite nodule, measuring 1 by 2 mm., near the base of the pedicle. His microscopic description at that time was as follows: "Section of this region revealed malignant melanomatous tissue immediately adjacent to the base of the pedicle, where there is some glandular mucosa along with some squamous metaplasia of this glandular epithelium. This growth does not appear to be far into the base but grows out in a tiny papillary fold on one side. Its presence, however, would seem to make the prognosis somewhat worse."

When the diagnosis of malignant melanoma had been made, it was decided that a radical Miles resection should be done, followed in two weeks by an inquinal gland dissection. The patient was then referred to the surgical section for consultation and operation. After a proper interval for preparation of the patient, and the intestine, the abdomen was entered for the resection. Exploration revealed no mesenteric or aortic lymph nodes. On palpation of the liver, multiple nodes were discovered. One near the surface was removed for a frozen section (Fig. 3).

The pathologist reported metastatic melanosarcoma. The abdomen was closed. The immediate postoperative course was uneventful, but the patient's progress since has been steadily downhill.

SUMMARY

1. Hypertrophied papilla have traditionally been labeled benign and inoffensive. This case has caused the author to look upon all papilla with a new interest and perspective.
2. A case is presented of a malignant melanosarcoma occurring in a hypertrophied papilla. So far as the author can determine from a search of the literature, it is the first of its kind to be reported.
3. All pigmented lesions of the anal canal should be surgically attacked. Operation should be performed promptly and boldly.

RESUMEN

1. Las papilas hipertrofiadas han sido consideradas tradicionalmente como benignas e inofensivas. El caso que se comunica ha llevado al autor a buscar las papilas con un nuevo interés y perspectiva.

2. Se presenta un caso de melanosarcoma maligno originado en una papila hipertrofiada. Conforme el autor pudo determinar buscando en la literatura, se trata del primer caso comunicado de esta naturaleza.

3. Todas las lesiones pigmentadas del canal anal deben ser tratadas quirúrgicamente realizándose la operación precozmente.

RIASSUNTO

1. Un'ipertrofia delle papille è stata sempre considerata di natura benigna, ma il caso osservato ha indotto l'autore a studiare tali formazioni con un interesse del tutto nuovo.

2. Viene descritto il caso di un melanosarcoma verificatosi in una papilla ipertrofica. Per quanto ne sappia l'autore è questo il primo caso riportato nella Letteratura.

3. Ogni lesione pigmentata del canale anale deve essere operata prontamente e radicalmente.

RÉSUMÉ

1. Les papilles hypertrophiées ont toujours été considérées comme bénignes et inoffensives, ce qui est une erreur pour l'auteur.

2. L'auteur présente en effet un cas de mélanosarcome malin, à point de départ d'une papille hypertrophiée. D'après ses recherches dans la littérature, il pense rapporter ici le premier cas de ce genre.

3. Dans toute lésion pigmentaire du canal anal, il faudrait recourir d'urgence à l'intervention chirurgicale.

ZUSAMMENFASSUNG

1. Hypertrophische Analpapillen werden herkömmlicherweise als gutartig und harmlos bezeichnet. Der vorliegende Fall hat den Verfasser veranlasst, die Papillen mit neuem Interesse und unter einem neuen Gesichtspunkt zu betrachten.

2. Der Verfasser berichtet über den Fall eines in einer hypertrophischen

Papille aufgetretenen bösartigen Melanosarkoms. Auf Grund seiner Nachforschungen in der Literatur kommt er zu der Annahme, dass es sich hier um den ersten derartigen zur Veröffentlichung gelangenden Fall handelt.

3. Alle pigmentierten Veränderungen des Analkanals sollten chirurgisch behandelt werden. Die Operation sollte unverzüglich und in grosszügiger Weise ausgeführt werden.

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If you are never solitary, you are never religious. Collective enthusiasms, revivals, institutions, churches, rituals, bibles, codes of behavior, are the trappings of religion, its passing forms. They may be useful, or harmful; they may be authoritatively ordained, or merely temporary expedients. But the end of religion is beyond all this . . . That religion will conquer which can render clear to popular understanding some eternal greatness incarnate in the passage of temporal fact.

—*Whitehead*

The Extracellular Fluid Response to Surgical Treatment

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IN a recent paper we reported a simple method of measuring the extracellular fluid volume, using a single injection of nulin.[1] Therein we presented 6 cases in which the extracellular fluid volume (ECFV) ranged from 16.6 to 22.4 per cent of the total body weight. Both sexes were studied within an age range of 13 to 62 years. We discussed the specific gravity of the body, as well as the endomorph ratng and its interrelationship with the extracellular fluid volume.[2]

In order to establish the normal range of the extracellular fluid volume by the aforementioned method, determinations were made on 61 carefully selected patients from our wards and outpatient department. The complete results of this study will be presented in another paper.[3] The average value for extracellular fluid volume for these 61 subjects was 18.7 per cent of total body weight, or 22.5 per cent of lean muscle mass. These results compare favorably with those obtained by tedious and more expensive technics.[4]

The object of this report is to present the fluid changes that occurred in consecutively chosen surgical patients in Bellevue Hospital and to support the thesis that this simple method is as accurate as the longer, more cumbersome methods.

Methods.—Some 500 determinations of extracellular fluid volume were carried out on 53 operative subjects. All determinations were performed by our single-injection inulin technic. Prior to the injection, samples of blood and urine were collected from the fasting patient. One thousand mg. of inulin in 10 cc. of 0.9 per cent saline solution was given intravenously. In forty minutes another 5 cc. of blood was withdrawn and placed in a heparinized tube. In older patients this second blood sample may be drawn in 50 minutes. The patient then voided or was catheterized immediately afterwards. Inulin determinations were made on all four samples, by Schreiner's resorcinol method.[5] The amount of inuloid material in the blood and urine blanks was subtracted from the plasma and urine concentrations to obtain the true inulin values. The amount of inulin injected minus the amount excreted in the urine, divided by the plasma level in milligrams per hundred cubic centimeters gave the extracellular fluid volume in cubic centimeters.

Since we began these studies a newer method has been reported,[6] in which chromagens and dextrose are destroyed and,

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

This article is republished here because of the inadvertent omission of Dr. Kovach's charts on its former appearance. The sincere apologies of the Journal are extended to the authors.

Submitted for publication Sept. 24, 1954.

therefore, do not affect the inulin determinations. If this method is employed it is not necessary to take blood and urine samples prior to injection. The extracellular fluid determinations can then be performed after meals and on patients with uncontrolled diabetes. This change is recommended in the procedure.

At first, a preoperative extracellular fluid level was obtained and postoperative determinations made daily, then at varying intervals, as required, for two or three weeks thereafter. All infusions were carefully noted, especially blood, sodium and potassium. The clinical status of the patient and the total fluid intake and output by all routes were recorded when indicated and correlated with changes in weight.

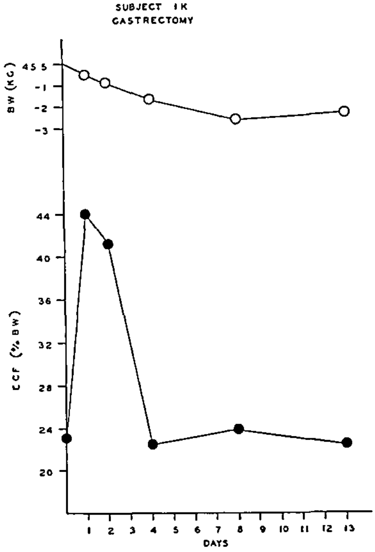

Fig. 1 (see text).

Results.—Surgical stress through neurogenic and humoral[7] activators causes the adenohypophysis to increase its output of corticotrophins. This, in turn, results in an increased liberation of corticoids and other "secretants" if the adrenal gland is functioning. These corticoids cause an increased tubular resorption of sodium and water lasting one to seven days, while one of the secretants causes a cellular permeability change (*vide infra*). There are other factors, such as the somatotrophic hormones and posterior pituitary antidiuretic hormones, the exact significance of which in the post-stress metabolism is not known.[8] Volume receptors may exist and play an important role in body fluid control.

It is noteworthy from a clinical point of view that there must be a reevaluation of the "sodium paradox" phenomenon. The paradox is the observation of a low or falling plasma sodium level in the face of a positive sodium balance. This has been reported by others. It was explained as due to an intracellular shift of sodium. The error of this assumption will be discussed later.

Briefly stated, the immediate postoperative metabolic response is one of nitrogen rejection, increase in extracellular fluid, augmented potassium loss, increased 17-ketosteroid excretion, eosinophil drop and loss of weight. As the patient recovers, these conditions all reverse themselves in two to fourteen days, depending upon the extent of the trauma.

The table is a brief summary of the pertinent points concerning each patient. "Type" refers to Sheldon's classification of somatotypes.[2] "ECF Change" is the change expressed as a percentage of total body weight; "O" indicates that no pathologic change was observed. The symbol "*" indicates that for one reason or another, such as a holiday, staff illness, accidental voiding by the patient in the bathroom or a technical mishap, determination for first or second postoperative day was not obtained and all subsequent determinations were normal, i.e., there was no postoperative rise in the extracellular fluid volume on the days studied. In some of these few cases it is possible that a transient rise occurred and was missed. Only 1 patient in this consecutive series was discarded and is not reported on, other than to mention that the studies in his case were of no value. This patient had prostatic hypertrophy with partial obstruction and residual urine. Since we did not realize this until too late in the studies and therefore did not obtain samples of catheterized urine, our urine inulin levels were erroneous.

A representative group of graphs showing the normal metabolic response to operation without complications is shown. The abscissae represent postoperative time in days, and the ordinates designate the extracellular fluid volume expressed as percentage of total body weight.

We noted that there was an increase in the extracellular fluid volume of about 3 per cent of total body weight, or approximately 2,000 ml., in those subjects who underwent minor surgical procedures. This increase occurs at once and lasts one to three days, after which the volume returns to normal levels. There is a small group of patients in whom the extent of trauma is so small with respect to the stamina of the patient that the "stress trigger mechanism" is not set in motion, and no increase in extracellular fluid takes place. In those subjects who underwent major operations, the increase in the extracellular fluid volume, expressed as percentage of total body weight, was more in the order of 9 per cent, or about 6,000 ml. We have consistently observed that this postoperative increase in extracellular fluid is independent of the output of urine if there is any renal function.

Specific Interpretation of Complicated Cases.—The main problem of the surgeon today is that of the metabolic and nutritional status of his patient. Surgical diagnosis, asepsis and technic are now on a scientific footing. In view of this, our interpretation of the aberrant fluid changes in the following complicated cases is presented, and their interrelations with electrolyte and metabolic changes are discussed.

The graphs of these patients are also presented and identified by the patients' initials. As will be seen, an abruptly falling extracellular fluid volume is of ominous portent. This occurred in 3 of our patients. One of these died, and the other 2 had extremely stormy postoperative courses.

Ninth Day Postgastrectomy Syndrome.—Subject F. V., who had undergone par-

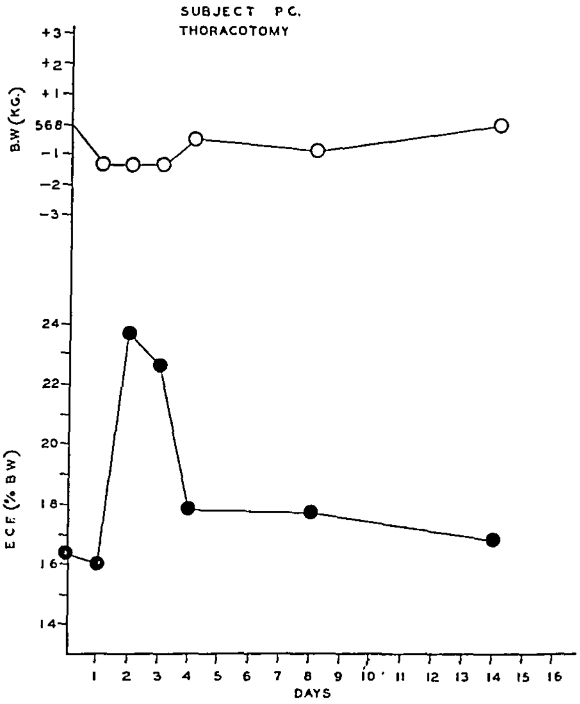

Fig. 2 (see text).

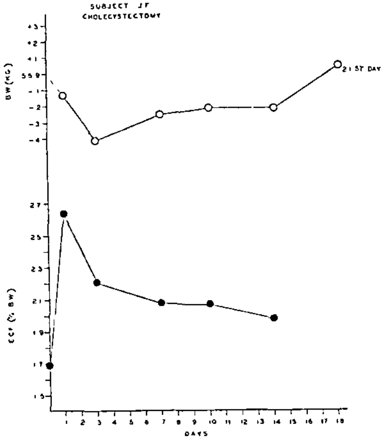

Fig. 3 (see text).

tial gastrectomy, developed on his 7th postoperative day the typical so-called "ninth day syndrome," characterized by weakness, nausea and distention. This patient's positive fluid balance by the seventh day amounted to 3,135 ml. The extracellular fluid volume had increased from 12,200 to 16,400 ml. between the third and seventh postoperative days. This was a gain of 4,200 ml. or 6.3 per cent of his total body weight. The distention disappeared by the eleventh postoperative day, at which time the extracellular fluid volume returned to 12,550 ml., or 18.6 per cent of body weight.

Since there is a great deal of connective tissue and, incidentally, fat in the submucosa of the gastrointestinal tract, this patient certainly had submucosal edema on the seventh postoperative day. This is part of the expanded extracellular fluid space. His body weight decreased 3.2 Kg. by the seventh day, proving that there could not be intracellular edema as well. In fact he actually would have lost intracellular water to the extent of 1,065 ml. (4,200 minus 3,135) if fat oxidation had not produced "metabolic water." It is reasonable to average out his seven-day accumulation of "metabolic fat water" at about 150 ml. per day, making a total of 1,050 ml., since two equivalents of fat give approximately one equivalent of water.

Adrenal Insufficiency, Extracellular Fluid Decrease and Intracellular Edema.—Occasionally a functional or anatomic adrenal insufficiency develops after operation and, when it occurs, it is a most important factor in the case of the seriously ill postoperative patient. There is then no increased tubular sodium and water resorption and none of the customary postoperative humoral oliguria.[9a] There is excretion of large volumes of urine, and with it of sodium, in concentrations over 40 meq. per liter (normal postoperative secretion of sodium in the urine is less than 20 meq. per liter).[9d] This occurs in the face of low plasma sodium levels. One also must remember that a low eosinophil count may occur in the presence of poorly functioning adrenals as well as when these glands are well functioning.[10] In this condition there are, as will be shown, intracellular edema, and a decrease occurs in the extracellular fluid volume.

S. F. (Fig. 3), with far-advanced carcinoma of the gallbladder, who died on the seventh postoperative day, showed this adrenal insufficiency of long-continued stress. Her daily postoperative urine volumes were between 1,000 and 1,650 ml. along with a falling extracellular fluid volume. This volume of urine was far above the expected output in her case. The total fluid balance was kept positive by 2,025 ml. through the use of intravenous therapy. The essential point is that the loss in weight was [illegible] the

Data from Bellevue Hospital, July 1952-June 1953

Patient	Sex & Age	Operation	Body Type	ECF Change, (% Weight)
A.C.	F; 41	Cholecystectomy & common duct exploration	5.5	+ 3
E.Mc.	M; 25	Repair of peroneal nerve	3	*
I.K.	F; 58	Subtotal Gastrectomy	3	+21
D.J.	M; 65	Subtotal Gastrectomy	2	+ 6
L.B.	M; 38	Subtotal Gastrectomy	2	+ 6
W.L.	M; 45	Subtotal Gastrectomy	5	+ 6
M.S.	F; 59	Subtotal Gastrectomy (95%)	6	+ 8
R.T.	M; 25	Subtotal Gastrectomy	4	*
C.H.	M; 56	Subtotal Gastrectomy	4.5	*
D.K.	F; 45	Right adrenalectomy	6	0
		Left adrenalectomy		+ 7
L.E.	M; 37	Radical neck dissection	3	0
J.C.	F; 61	Abdominoperineal resection	5.5	+ 4
D.A.	F; 60	Excision of cholesteatoma of breast	6	0
P.C.	M; 50	Thoracotomy	3	+ 8
E.B.	M; 47	Amputation of toe	4	+ 9
J.T.	M; 50	Skin graft	4	+ 9
A.E.	F; 38	Removal of Lane plate from tibia	5	0
A.B.	M; 74	Right colectomy	3	*
J.B.	M; 34	Herniorrhaphy	4	+ 5
V.M.	M; 23	Herniorrhaphy	2	+ 7
A.M.	M; 19	Herniorrhaphy	4.5	0
S.C.	M; 69	Herniorrhaphy	3	+ 9
R.C.	M; 48	Herniorrhaphy	4	+ 5
J.Mc.	M; 56	Herniorrhaphy	4	+ 3
D.G.	M; 59	Herniorrhaphy	5	0
E.O'B.	M; 59	Herniorrhaphy	6	+ 6
P.P.	M; 55	Herniorrhaphy	3	+ 4
C.A.	M; 61	Herniorrhaphy	3	*
O.S.	M; 17	Herniorrhaphy	2.5	*
A.K.	M; 36	Herniorrhaphy	5	*
I.S.	M; 54	Herniorrhaphy	3	+11
M.Mc.	F; 65	Radical mastectomy	5	+ 5
D.H.	M; 28	Appendectomy (gangrenous)	5.5	+10
P.W.	M; 67	Lumbar sympathectomy	5.5	0
M.S.	M; 48	Hemorrhoidectomy	4	+10
R.B.	M; 53	Hemorrhoidectomy	4	0
J.C.	M; 50	Hemorrhoidectomy	3	0
V.K.	M; 45	Hemorrhoidectomy	5	0
C.K.	M; 41	Hemorrhoidectomy	3	*
I.V.	F; 33	Hemorrhoidectomy	5	*
A.R.	M; 56	Repair of rectal fissure	5.5	+ 4
V.W.	M; 64	Ventral herniorrhaphy	6	+ 7
M.T.	M; 65	Varicose vein ligation	3	+ 3
J.Mc.	M; 51	Varicose vein ligation	6	0
F.K.	M; 64	Cholecystectomy & common duct exploration	4	0
J.F.	M; 56	Cholecystectomy	2	+ 8
E.A.	F; 26	Cholecystectomy	6	0
F.V.	M; 33	Subtotal gastrectomy	5.5	*
E.W.	F; 75	Abdominaloperineal resection, hysterectomy and vaginectomy	5.5	— 5
S.F.	F; 67	Exploratory laparotomy	3	— 5
A.T.	F; 62	Cholecystectomy & common duct exploration	5	— 6

crease in the extracellular fluid volume decrease. Loss of weight aside from loss of water is due to protein catabolism and its associated gluconeogenesis, followed by energy release on its metabolism, together with fat oxidation. The total body carbohydrate content of 500 Gm. is soon exhausted. This means that a gain in intracellular water occurred, with its accompanying water intoxication. The extracellular fluid volume showed a marked decrease of 3,400 ml., a fall from 33 to 25.7 per cent of the total body weight (15,900 to 12,500 ml.) after the second postoperative day. It was nonetheless higher

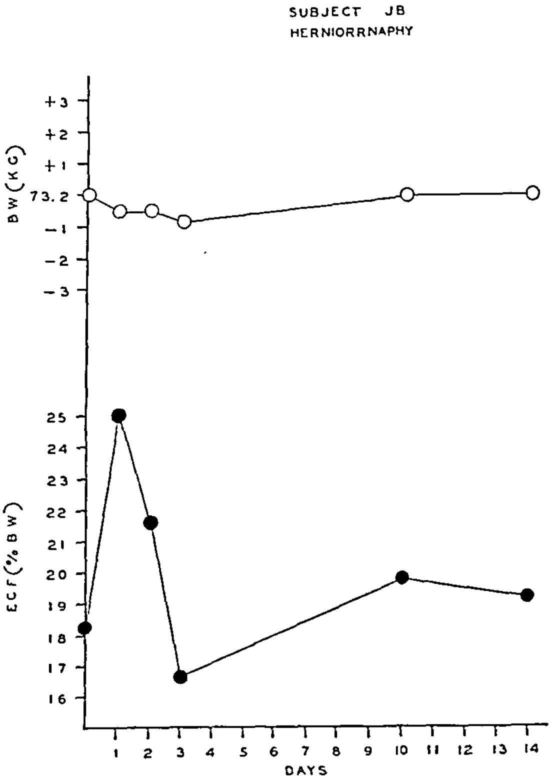

Fig. 4 (see text).

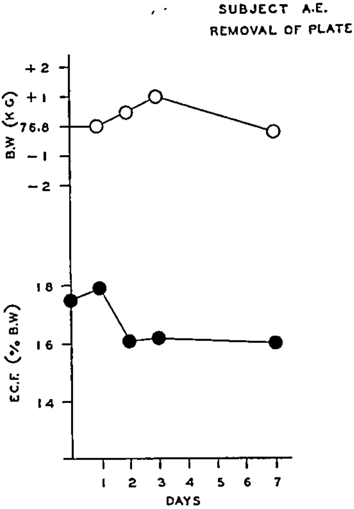

Fig. 5. (see text).

than the patient's normal volume of 20 per cent. Here we have an intracellular water shift of at least 5,425 ml. (3,400 ml. plus 2,025 ml.), together with an intracellular gain of the metabolic water of fat and protein oxidation. Six hundred Gm. of fat can be oxidized in one day by the seriously ill postoperative patient. Since 2 equivalents of fat give 1 of water, 600 Gm. of oxidized fat will result in the production of 300 ml. of water daily. Cellular edema and decreased cell osmolarity follow.

One can postulate that, in the presence of adrenal insufficiency, the usual corticoid-induced increase of cell permeability, with its outward shift of water and sodium, does not occur, and the resultant intracellular sodium shift will be less. There will be a decrease transfer of cellular potassium into the extracellular space and out in the urine. This patient was not given any sodium or potassium other than the 57 meq. of sodium and 20 meq. of potassium in her one blood transfusion. She would have a differential cellular potassium deficiency with lowered potassium reserve due to a long preoperative poor dietary intake and would be vulnerable to hypokalemia. In spite of her adrenal insufficiency some potassium would still be constantly lost in the urine.

In this patient the normal adrenal "secretant-induced" increase in extracellular fluid volume was reversed and cellular edema occurred, probably owing to adrenal insufficiency. The extracellular water became intracellular fluid, and "water intoxication" occurred. This patient, then, represents a case of extracellular water loss, intracellular edema and probable adrenal insufficiency, with a fatal outcome.

Hypokalemia and "Potassium Anoxia." —Patient A. T. (Fig. 4) who underwent cholecystectomy with exploration of the common duct, represents a case of hypokalemia with its usual "dehydration" or

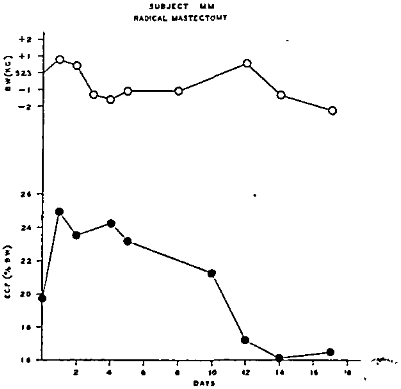

Fig. 6 (.

fect suffering from cellular anoxia. Its nprovement gives an immediate clinical esponse.

Potassium is involved in the red cell in xygen transport as follows:[13]

While blood is in the tissues (as hemoglobin loses potassium it gives up its oxygen more easily)

$KHb \ldots\ldots\ldots\ldots\ldots\ldots\ldots KHb + O_2$

$KHb + H_2CO_3 \ldots\ldots\ldots\ldots KHCO_3 + HHb$

While blood is in the lungs (reduced Hb being a weaker acid than oxy Hb and as Hb binds more K it increases its affinity for O_2)

$KHCO_3 + O_2 + HHb \ldots KHbO_2 + CO_2 + H_2O$

Also in the lungs

$KLC + HHb + O_2 \ldots\ldots KHbO_2 + HCL$

"CL shifts" out of the red cells into the plasma and

$HCL + NaHCO \ldots NaCL + CO_2 + H_2O$

It is thus apparent how essential potasium is in the mechanism of oxygen transort.

It is also obvious that carbon dioxide ansport is intimately bound up with emoglobin, potassium, chlorides and lasma protein. Carbon dioxide, after having been diffused into the red cells, combines with potassium in the cells. Carbon dioxide also combines with the plasma sodium, an equivalent amount of chloride shifting into the cells.[14] With deficient potassium, both these mechanisms are interfered with. There is a "potassium anoxia" and excess of carbon dioxide. It is possible that the anion to which the protein of carbonic anhydrase is bound is potassium, and hence the recent clinical benefit derived from "diamox" may also be partially dependent on its effect on potassium.

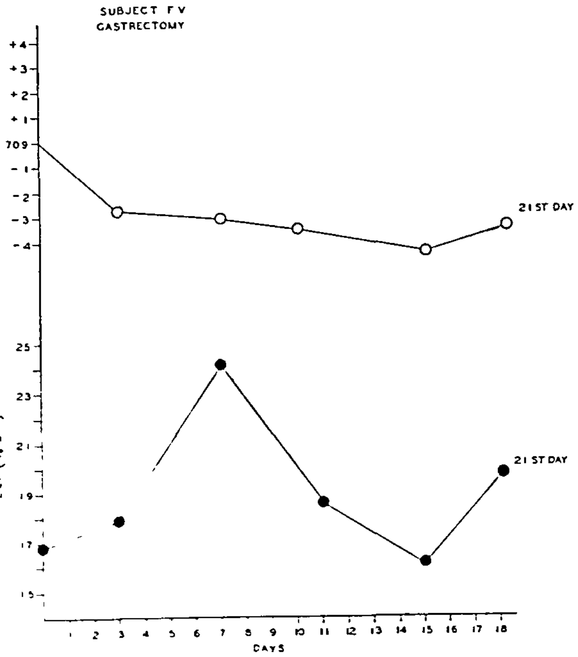

Fig. 11 (see text).

An examination of the classic oxygen association curve[12a] of hemoglobin shows that there is a shift to the right, with a decrease in electrolyte concentration. This means that there is an impairment of the dissociation of oxygen from its hemoglobin in the presence of a lowered electrolyte.

The importance of potassium in the oxygen transport mechanism has additional support in the recent report of Aronstam[15] that in thoracic surgery, in which one is dealing with pulmonary emphysema, fibrosis and arteriosclerosis, there is no negative potassium balance. It would appear that the usual postoperative augmented urinary loss of potassium is prevented by the body, in view of the increased danger of hypoxia in pulmonary disease.

The postoperative decrease in the plasma sodium level normally observed has recently been explained by workers in electrolyte studies as due to an intracellular shift of sodium. This change may become even more pronounced, of course, in patients with marked electrolyte losses, and curiously enough the administration of saline solution further lowers this decreased sodium level. The term "sodium paradox" has been coined to designate this apparent discrepancy.

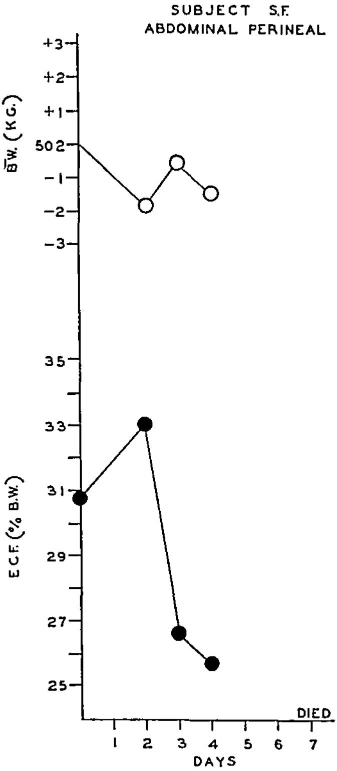

Fig. 12 (see text).

Our studies show that there are two *normal types of electrolytic response to* surgical stress. First, in a clinically well patient, there may be no change in the extracellular fluid volume. Second, there may be a marked increase in extracellular fluid volume, commencing after operation. All this occurs irrespective of change in body weight and so occurs without a positive water balance.

There appears to be for each patient a "stress trigger point" below which there will be no change in the extracellular fluid volume and over which there occurs a marked increase in extracellular volume. The magnitude of the procedure and the adaptive mechanism of the patient govern the type of response. The important point is that it does not depend on sodium intake. This increase in extracellular fluid occurs when no intravenous saline solution is given and no sodium is taken by mouth, with no positive water balance and in the presence of a decrease in the plasma sodium level. In all our cases saline solution was given only to cover sodium losses by tube or bowel. No more than the absolute minimum was given. This means that most patients were given none.

What does take place is that potassium leaves the cells with this water and is lost in the urine if there is a negative potassium balance. Sodium also leaves the cells, owing to the change in cell permeability as a result of the aforementioned "secretants." The average postoperative patient, shifting about 4,000 milliliters of intracellular water, shifts approximately 300 milliequivalents of sodium along with it into the extracellular space; otherwise the plasma potassium level would be much lower than it is. A protein-bound electrolyte, probably calcium,[16] is liberated in the cells to maintain the ionic intracellular balance resulting from this shift.

This phenomenon of increase in extracellular fluid by shift of intracellular to extracellular water, together with a shift of sodium in the same direction, is a normal postoperative occurrence.

COMMENT

From a teleologic point of view one can see why man has come to show this adaptation to injury. The injured primitive animal lost blood and lay helpless under a tree. The only way he could get salt was to go to a salt lick, just as deer and moose do today. Supposing him to be a carnivorous animal, he would have to seek and kill his prey to replenish his own lost electrolytes and blood. He could do neither of these until he had recovered sufficiently. Nature thus conserved its salt and water by the increased liberation of desoxycorticosterone and other steroids.

With potassium the state of affairs was different. The animal oxidized fat for energy and constantly broke down body protein. Through increased corticoid production gluconeogenesis went ahead to provide him with energy from protein transformation. Some protein was used for reparative processes. This early catabolic protein phase released potassium steadily, with a potassium ratio in respect to nitrogen breakdown, of more than the normal 2.94 milliequivalents per gram. This breakdown ratio was especially high on the first day, perhaps to unload the body, so that when the period of renal stress with oliguria a toxic excess of potassium would be averted. Since the intracellular water potassium concentration is 175 milliequivalents per liter,[9a] or a little less, the cells would tend to lose an equivalent amount of water with this potassium loss into the extracellular space. The intracellular potassium loss was probably replaced by a freeing of bound calcium.[14]

This same calcium freeing mechanism can replace the intracellular sodium loss to the extracellular fluid. Bone also is a source of ionic sodium to supply fluid spaces, including the intracellular compartment.

Potassium excretion may reach 100 milliequivalents on the first postoperative day and then drop to a lower constant daily loss. This loss is replaced possibly by freeing of protein-bound calcium to maintain osmolarity. About 4,000 ml. of fluid now shifts from the cells to become extracellu-

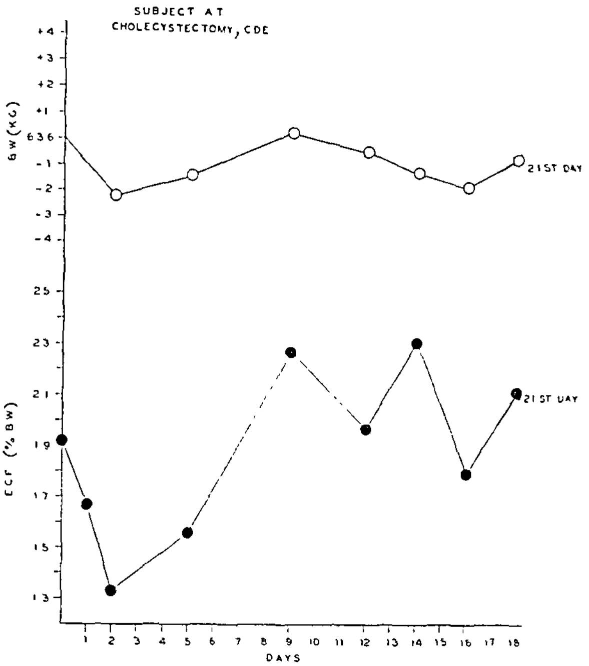

Fig. 13 (see text).

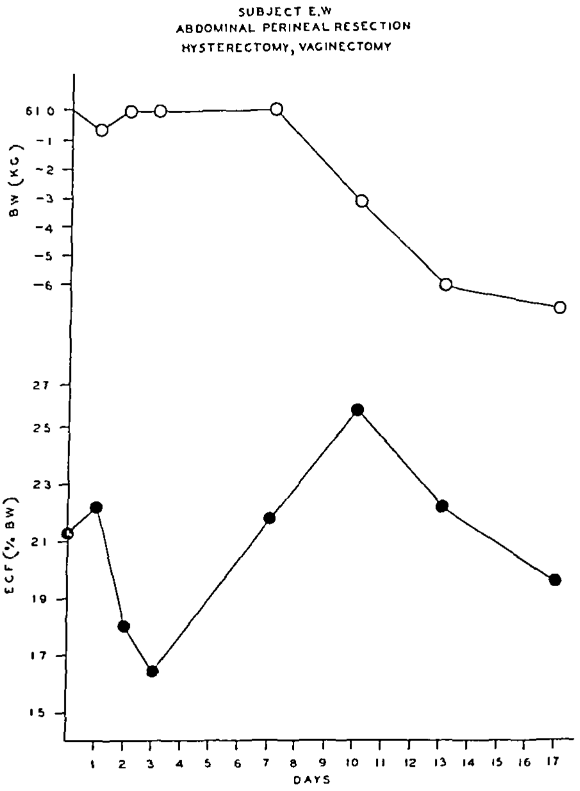

Fig. 14 (see text).

lar fluid. This would cause a marked drop in the sodium concentration. The usual drop observed is much less than this. It *follows that sodium too leaves the cells.*

SUMMARY

The first large study of changes in the extracellular fluid volume in a comprehensive series of consecutively chosen surgical subjects is presented.

Interpretation of the normal and the abnormal responses to surgical stress is given in the light of a new concept of electrolyte *and fluid shifts. The following* conclusions are drawn:

The preoperative extracellular fluid volume is a very sensitive index of the "water-electrolyte" status of the patient.

In those patients in whom operative trauma is sufficient to surpass the "stress trigger point" there normally occurs an increase in the extracellular fluid volume of from 2,000 to 8,000 ml., or from 3 to 9 per cent of the total body weight. Under these circumstances, if this does not occur, there is or has been preoperative dehydration. If it is greater than expected, there is overhydration.

A postoperative fall in extracellular fluid volume is of ominous portent, and in our cases was accompanied by or due to an increase in intracellular water ("water intoxication") and is probably due to adrenal failure. A real fall occurs in the extracellular fluid volume in this state.

The ninth day postgastrectomy syndrome is due to an increased extracellular fluid volume.

The stress-induced increase in extracellular fluid volume does not depend on the administration of sodium. It occurs when *no sodium is given or when there is merely* a replacement of sodium loss. It is accompanied by a shift of sodium into the extracellular fluid space.

RIASSUNTO

E' il primo grosso studio delle variazioni di volume del liquido extracellulare in una serie di pazienti sottoposti a cure chirurgiche. L'interpretazione delle reazioni, normali od abnormi, al trauma chirurgico vien data alla luce di un nuovo concetto sui rapporti fra fluidi ed elettroliti. Vengono tratte le seguenti conclusioni: il volume pre-operatorio del liquido extracellulare è un indice assai sensibile del rapporto "acqua-elettroliti" in cui si trova il paziente. In quei pazienti in cui il trauma operatorio è tale da produrre uno shock, normalmente si verifica un aumento di volume del liquido extracellulare variante da 2000 a 8000 ml. (como a dire dal 3% al 9% del peso corporeo). Se *ciò non dovesse accadere vuol dire che*, preoperatoriamente, esisteva uno stato di disidratazione. Se, invece, l'aumento di volume fosse maggiore vuol dire che c'era uno stato di iperidratazione. Una diminuzione post-operatoria del volume del liquido extracellulare è di cattivo augurio; nei casi studiati dagli AA. tale fatto si accompagnò, o era dovuto, ad un aumento del liquido intracellulare, in relazione probabilmente con una ipofunzione surrenale. In tale condizione si assiste ad una vera caduta del volume del liquido extracellulare. La sindrome che, in nona giornata, segue talvolta la gastrectomia è dovuta ad un aumento di volume del liquido extracellulare. *L'aumento di volume del liquido* extracellulare, dopo traumi chirurgici, non dipende dalla somministrazione di sodio, tanto vero che esso si verifica anche quando non viene somministrato sodio o quando la quantità di questo vale soltanto a rimpiazzare la quota perduta. Esso aumento si accopagna ad una fuoriuscita di sodio negli spazi extracellulari.

RESUMEN

Se presenta el primer estudio grande acerca de los cambios de volumen líquido extracelular en una serie de sujetos quirúrgicos escogidos sucesivamente.

Se dan interpretaciones de respuestas normales y anormales al stress quirúrgico, a la luz de un concepto nuevo de cambios líquidos y electrolíticos. Se derivan las siguientes conclusiones:

En volumen líquido extracelular preoperatorio es un índice muy sensible del estado "acuosoelectrolítico" del paciente.

En aquellos pacientes en los que el trauma quirúrgico es suficiente para sobrepasar el "punto de gatillo" se produce normalmente un aumento del volumen líquido extracelular de 2000 a 8000 cc., o de 3 a 9 por ciento del peso corporal total. Bajo estas circunstancias, si esto no ocurre, existe ó ha existido preoperatoriamente deshidratación. Si la respuesta es mayor existe sobrehidratación.

Una caída postoperatoria en el volumen líquido extracelular es de pronóstico malo y en nuestros casos se acompañó o fué debida a un aumento del agua intracelular (intoxicación acuosa), probablemente debida a insuficiencia suprarrenal. En este estado ocurre una caída real en el volumen líquido extracelular. El síndrome postgastrectomía del noveno día es debido a un aumento del volumen líquido extracelular.

El aumento del volumen líquido extracelular inducido por el "stress" no depende de la administración de sodio. Ocurre cuando no se da sodio o cuando existe únicamente un reemplazamiento de la pérdida sódica, qué se acompaña de un cambio de sodio hacia el espacio líquido extracelular.

RÉSUMÉ

Les auteurs présentent la première étude importante sur les modifications du volume du liquide extracellulaire dans une série de cas chirurgicaux.

Ils donnent une intreprétation des réactions normales et anormales, à la lumière des nouvelles conceptions de l'électrolyte et des modifications du liquide extracellulaire, et en tirent les conclusions suivantes.

Le volume pré-opératoire du liquide extracellulaire est un indicateur très précis du status "eau-électrolyte" du malade.

Chez les patients où le choc opératoire suffit à dépasser le "stress trigger point," il se produit normalement une augmentation du volume du liquide extracellulaire allant de 2000 à 3000 ml, ou de 3 à 9% du poids total du corps. Dans le cas contraire il y a, ou il y a eu une déshydratation pré-opératoire. Lorsque ces chiffres sont dépassés il y a sur-hydratation.

La chute post-opératoire du volume du liquide extracellulaire est de mauvais augure, et dans les cas des auteurs elle était accompagnée d'une augmentation de la quantité du liquide intracellulaire (ou causée par elle), et probablement par une carence d'adrénaline. Le syndrome postgastrectomique du 9ème jour est dû à une augmentation du volume du liquide extracellulaire.

Une augmentation importante du volume du liquide extracellulaire ne dépend pas de l'administration de sodium, elle se produit aussi lorsqu'on ne donne pas de sodium ou lorsqu'il y a simplement un remplacement de la perte en sodium. Elle est accompagnée d'un déplacement de sodium dans le liquide extracellulaire.

ZUSAMMENFASSUNG

Es liegt die erste umfangreiche Untersuchung der Veränderungen im extrazellulären Flüssigkeitsgehalt auf Grund einer umfassenden Serie aufeinanderfolgender chirurgischer Fälle vor.

Die Deutung der normalen und pathologischen Reaktionen auf chirurgische Belastung erfolgt im Lichte einer neuen Auffassung vom Elektrolyten- und Wasseraustausch. Es werden die folgenden Schlussfolgerungen gezogen:

Die präoperative extrazelluläre Flüssigkeitsmenge ist ein sehr empfindlicher Index des "Wasser- Elektrolyten"-Zustandes des Kranken.

Kranke, bei denen das operative Trauma des chirurgischen Eingriffs stark genug ist, die "stress"-Auslösungsschwelle zu überschreiten, weisen gewöhnlich einen Anstieg der extrazellulären Flüssigkeitsmenge von 2000 auf 8000 ccm oder von 3 auf 9% des gesamten Körpergewichts auf. Bleibt dieser Anstieg unter den gleichen Bedingungen aus, hat eine präoperative Wasserverarmung vorgelegen. Ist der Anstieg grösser als zu erwarten war, so handelt es sich um eine Wasseranreicherung.

Ein postoperatives Sinken des extrazellulären Flüssigkeitsgehalts ist ein unheilvolles Zeichen und war in den Fällen der Verfasser begleitet von oder zurückzuführen auf einen Anstieg des intrazellulären Wassergehalts ("Wasservergiftung"); wahrscheinlich beruht es auf einen Versagen der Nebenniere. In diesem Zustand kommt es zu einem echten Absinken der extrazellulären Flüssigkeitsmenge. Der am neunten Tage nach einer Magenresektion auftretende Symptomenkomplex beruht auf einem Anstieg der extrazellulären Flüssigkeitsmenge.

Der "stress"-bedingte Anstieg der extrazellulären Flüssigkeitsmenge ist von der Natriumzufuhr unabhängig. Er tritt ein, wenn kein Natrium zugeführt wird, oder wenn lediglich der Natriumverlust ersetzt wird. Der Anstieg geht mit einer Verschiebung des Natriums in die extrazellulären Flüssigkeitsräume einher.

SUMARIO

É apresen ado o primeiro amplo estudo das alterações do volume líquido extracelular numa série de pacientes cirúrgicos consecutivos e escolhidos.

É dada a interpretação das respostas normal e anormal ao ato cirúrgico, sob a luz de um novo conceito sôbre as mudanças eletroliticas e líquidas. As seguintes conclusões são apresentadas:

O volume líquido extracelular pré-operatório é um índice muito sensivel do estado "eletrolitico-aquoso" do paciente.

Nos pacientes em que o trauma operatório é suficiente para ultrapassar o ponto crítico, ocorre normalmente um aumento do volume líquido extracelular de 2000 a 8000 ml., ou de 3 a 9 porcento do pêso total do côrpo. Nessas circunstancias, se tal não acontecer, há ou houve desidratação pré-operatória. Caso seja maior do que o esperado, há superhidratação.

Uma queda pós-operatória no volume líquido extracelular e de más consequênciasem quatro de nossos casos foi acompanhada por um aumento na água intracelular ou (intoxicação por água) ou devida à mesma, sendo provavelmente devida a uma insuficiênica supra-renal. Neste estado ocorre uma queda pós-operatória verdadeira no volume líquido extracelular. O sindrome pós-operatório do 9° dia é devido a um aumento do volume líquido extracelular.

O aumento do volume líquido extracelular provocado pelo trauma não depende da administração do sódio. Ocorre quando não é administrado sódio ou quando há meramente a reposição do sódio perdido,

sendo acompanhado pela mudança do sódio para o espaço líquido extracelular.

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All the best things and treasures of this world are not to be produced by each generation for itself, but we are all intended, not to carve our work in snow that will melt, but each and all of us to be continually rolling a great white gathering snowball, higher and higher, larger and larger, along the Alps of human power.

—*Ruskin*

Man as a race does not know what his limits are, where his boundaries lie. The race has constantly surprised itself by discovering that limits are not limits but ways, that the ocean is not an obstacle but a highway, that the forest is not a dark and threatening barrier but a useful source of food, light and shelter.

—*Frebaugh*

Property may be destroyed and money may lose its purchasing power; but, character, health, knowledge and good judgment will always be in demand under all conditions.

—*Babson*

Section on
Ophthalmology and Otorhinolaryngology

PAUL C. CRAIG, M.D., F.A.C.S., F.I.C.S., EDITOR

Symposium on the Facial Nerve
Presented at the Nineteenth Annual Congress of the United States
and Canadian Sections,
International College of Surgeons, Chicago, Sept. 8, 1954

The Facial Nerve

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IN this aspect of the symposium, that part of the facial nerve which lies within the temporal bone is considered. During the development of the facial nerve and in early infancy, the nerve assumes a different position in the petrous bone and at the exit from that observed in the completely developed temporal bone in the young and in adults. The main course of the nerve in the mastoid portion may be topographically changed owing to impairment of the growth of the mastoid process.

The segment of the facial nerve of special interest to the otologist is the one located between the orificial entrance in the porus acusticus internus of the petrous bone and the exit of the nerve at the base of the skull, anterior to the two tips of the mastoid process. This canal is known to older anatomists as the aquaeductus Fallopii.

Embryologic Development of the Facial Nerve and Canal.—Embryologically the seventh nerve appears as a part of the acousticofacial ganglion, which can be seen in the early embryo (three weeks). It is medially adjacent to the otocyst; with the progressive growth of the petrous bone the ganglion becomes separated from the acousticofacial ganglionic mass (7 mm. embryo). The facial nerve with its separate ganglion appears at the end of the third month, at which time the nerve and the ganglion are situated in a cartilaginous groove; the groove later becomes ossified. In the fifth month a canal comes into existence. At the time of separation of the facial nerve from the acousticofacial ganglion a variable amount of ganglion cells may remain in the course of the nerve within the inner canal and persist as a second facial ganglion. The ganglion cells are distinguishable by their size, as they are smaller in the vestibular bipolar ganglion cells.

The bony groove is actually situated in the labyrinthine bone. The rostral end of the groove sometimes permanently re-

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

*More than forty photographs, drawings, dissections and photomicrographs were displayed in Dr. Tamari's original presentation.

Submitted for publication Oct. 20, 1954.

mains without a bone covering. This can be seen especially in the area of the geniculate ganglion. The covering membrane consists of connective tissue blended with the dura mater of the middle fossa.

The tympanic segment of the facial nerve which lies in the potential middle ear cavity, also appears to lack a cover of bone in its lateral aspect. Often after birth, and even later, the groove may be closed and become a canal. The covering membrane is formed by a dense connective tissue which is in close connection with the epineural sheet. It may later become the inner periosteal layer of the canal. The closure of the canal in this area is not always complete. Especially at the juncture with the labyrinth wall, small dehiscences of bone may be observed. These dehiscences may be as long as 2 mm. and as wide as 1 mm. Vessels from the mucosa of the middle ear may anastomose with the vessels of the nerve through these dehiscences. Similar dehiscenses have been observed in elderly persons, in whom its presence has been explained on the basis of senile osteoporosis. In my experience these dehiscences persist from the developmental stage. In some animals—for instance, in the dog, cat, rabbit and rat—the facial nerve has no tympanic bone covering in its vertical portion.

Incomplete bone canals can also be observed in the vertical course. This occurs especially in a highly pneumatized mastoid. Either the canal is separated by a thin mucosal membrane from the adjacent mastoid cell or the cell is in direct communication with the canal.

In the newborn, therefore, the facial nerve is only partly enclosed in a canal. Its proximal segment is partly bone. Its peripheral segment lies free, uncovered by bone. The exit of the nerve appears anterior to the mastoid tubercle and is situated superficially to the posterior rim of the tympanic ring. Its course is oblique and parallel to the cartilaginous styloid process.

The bony canal for the chorda tympani likewise develops after birth. The bone overgrowth for this canaliculus originates at the contact of the petrous and squamous juncture. The ossification of the tegmen of the canal originates in the area above the hiatus, forming a triangular plate that grows laterally. The supratympanic portion is the last to become ossified. Two thin bone plates form around the stapedial muscle to create the eminentia pyramidalis, with a persistent small opening for its tendon. The canal for the stylomastoid foramen is formed at the area where the hyoid arch coalesces with the ear capsule.

The Seventh Nerve Canal.—The course of the facial nerve canal after the second year of life is similar to its course in an adult, except that the vertical portion of the canal is shorter. The bony canal in an adult begins at the fundus of the inner auditory canal. It is situated in the area above the crista transversa in the medial aspect, lying medially to the vestibular area. This short area between the fundus of the inner canal and the ganglion geniculate is about 3 mm. long and 1 mm. in diameter. The course of the canal in this section is not in the axis of the inner canal but runs at an angle between 30 and 50 degrees. The bony groove, that is, the canal that houses the ganglion, is elliptic. The canal is here from 2 to 3 mm. wide. This section of the nerve runs near the cochlea. The periosteal layer of the labyrinth wall often shows a slight excavation in this area at the height of the second coil of the cochlea.

The supratympanic section of the canal, which extends from the distal part of the geniculate ganglion, runs above the oval window in a backward direction. This segment is often characterized by the dehiscences, and it is about 1 to 1.5 mm. in diameter. Topographica [illegible] s [illegible] mpanic portion terminates above the exit of the stapedial muscle (eminentia stapedia). The next adjacent segment of the canal is the post-tympanic portion. Because the course of the canal is directed slightly posterior and downward, the course changes to a downward direction below the middle of the semicircular horizontal canal.

The vertical portion, which appears to be the most important surgically, is from 10 to 13 mm. long and 1 to 1.5 mm. in diameter. The course of the canal is not always absolutely vertical; it runs sometimes in a slight outward-slanting position. The vertical part begins about 2 mm. below the bulge of the horizontal canal. It sometimes appears enlarged through communication with the canal for the stapedius muscle and may be as large as from 2 to 3 mm. at this point. The exit of the canal is always enlarged in comparison with the bore of the entire canal, its portion being anterosuperior and medial to the outer tip of the mastoid. The average diameter of the stylomastoid foramen is 2 mm. The funnel-like enlargement of the canal depends on the division of the facial nerve into its main branches and on the entrance of vessels into the canal. In my bone collection and histologic sections, I could not find an anatomic narrowing of the exit. In relation to the drum membrane, the canal is about 3 mm. posterior to the line of the latter's attachment. In relation to the tympanic sinus, one can often observe that this depression of the middle wall reaches the nerve and its medial aspect. The thin bone plate, which may be dehiscent, is the only area that could not be inspected during surgical procedures. In relation to the descending part of the sigmoid sinus, it was observed that in a contracted mastoid with an anterior and lateral positioned sinus wall the canal of the facial nerve near the exit is separated only by a bone plate 2 to 3 mm. thick. The canal appears near the posterior wall of the external canal in a highly pneumatic bone. It is proportionately farther from the posterior wall in a sclerotic bone. In adults the vertical portion of the canal ramifies at the border between the second and third portions into a small canaliculus for the chorda tympani. This canaliculus runs obliquely and anteriorily upward and terminates at a posterior iter in the tympanic sulcus just medial to the drum membrane.

The Seventh Nerve.—The seventh nerve is a mixed nerve with a small sensory portion and a larger motor portion. From the pyramidal cells of the cortex the motor fibers run their course through the knee of the internal capsule and the cerebral peduncles and seventh nucleus in the pons of the same side and in a larger number of fibers at the opposite side. Fibers originating from the seventh nucleus encircle partly the nucleus of the abducens nerve and appear between the spinal tract of the trigeminus and the sixth nerve nucleus. Leaving the pons, the seventh nerve fibers together with the sensory parts or nervous intermedius enter with the eighth nerve into the bony inner acoustic canal. The intermedius is situated near the cochlear nerve. In the inner canal the nerve fibers contain a small amount of connective tissue and the nerve bundles appear to be separated by thin septums. In the facial canal proper, including the area of the ganglion, the nerve appears as a single bundle surrounded by perineurium. In some histologic sections from elderly persons one observes that the nerve bundles are separated again by thick intramural sheets. The nerve runs horizontally for about 10 mm.

Leaving the fundus of the inner canal, the intermedius nerve loses its identity and is only rarely seen as a separate bundle. The seventh nerve then curves anteriorly to the geniculate ganglion. The ganglionic mass is located in the area of the canal where the nerve turns posteriorly, entering the supratympanic part above the oval window. In the area of the ganglion, numerous fibers pass by and do not intermingle with the ganglion cells. In this part of the canal the nerve seems to fill out the canal except for the vascular space. Deep, narrow bundle sheets divide the nerve into two or three sections, corresponding to the branches of the nerve at the exit. The epineurium appears less compact and is attached to the inner periosteum of the canal. The petrosal nerve enters at the anterior and medial [illegible] of the ganglion, coming from [illegible] ior surface of the petrosal [illegible] the facial canal). The [illegible] res from 2.5 to 3 mm. [illegible] nthic area below the ben[illegible] tiny nerve twig is sep[illegible] nerve for the stapedial m[illegible] tympani enters into th[illegible] about the lower third of [illegible] been mentioned. The c[illegible] free at birth and later [illegible] ed by bone, which form[illegible] parate [illegible] at the exit into the middle ear, the chorda tympani nerve is encl[illegible] in a duplicature of middle ear mucosa. In the area of the bend, the surrounding epineurium and the connective tissue again appear less dense. This is probably associated with a larger blood supply at this area.

The descending facial nerve, appearing in one larger bundle, occasionally exhibits longitudinal divisions. The loose epineurium and the perineural sheets occupy about a third of the canal. The fibers of the nerve corresponding to individual branches seem not to run parallel in the descending canal. With the method of Hoffmann, using a mild solution of hydrochloric acid, I have been able to separate the two main branches of the nerve. There is a tendency for the two main branches to rotate during the course in such a manner that the superior branch is situated in the inner canal and in the area of the first knee above the inferior branch. In the descending portion of the nerve the superior branch lies laterally to the inferior and again anteriorly at the stylomastoid foramen.

The chorda tympani fibers run superficially along the course of the superior branch. These fibers, progressing cranialward and carrying taste impulses from the tongue, extend into the medulla to the nucleus and tractus solitarius.

Vascularization. — The arteries that provide vascularization of the seventh nerve are derived mainly from the branches of the external carotid. The stylomastoid artery, which enters the facial canal through the stylomastoid foramen, is a branch of the posterior auricular. The petrosal artery from the medial meningeal reaches the canal from the area of the knee of the ganglion. It takes a descending course to the stylomastoid foramen. In the inner canal, the internal auditory artery, a branch of the anterior inferior cerebellar artery, occasionally supplies the nerve; furthermore, the labyrinthic artery, when branching from the basilar artery, participates as a nutritional vessel for the intercanal segment. The arteries running in both directions overlap and provide sufficient blood supply for the nerve. Small longitudinal branches reach the epineurium. From here the arteries pass into deeper perineural sheets and into nerve fasciculi, forming precapillaries and longitudinal capillaries. Lately this was demonstrated again in an experimental study by Sullivan and Smith.

Landmarks. — External landmarks for the inner vertical course of the seventh nerve have often been suggested, and the exact location has been calculated. Tremble (Fig. 1) described a line running through the spina of Henle toward the zygomatic root at an angle of 15 degrees. The vertical portion of the nerve lies, then, in the perpendicular plane to this line crossing the spina. Batson advocated an "undescribed" landmark for the mastoid portion of the canal; the tympanic-mastoid suture. The facial nerve lies medial to the suture at a depth that depends on "the lateral thickness of the mastoid." Gleason suggested running a probe along the digastric groove posteriorly to reach the facial nerve. He introduced the term "ridgepole of the digastric fossa," which assures that the ridge is always at its extremity over the stylomastoid foramen.

In my experience the most convenient way to find the stylomastoid foramen was suggested by Bridgett in 1923. The bone covering the fossa digastrica produces in the mastoid a crest (crista digastrica). The bony lamella extending upward at the anterior end of the crista along the posterior bony canal represents the facial canal wall. A junction of the crista with the posterior canal wall (junctio-infremastoidea) marks the foramen. A line from this junction to the aditus of the antrum marks the course of the vertical canal.

Occasionally roentgenograms taken with the patient in the Schuller position mark the vertical course of the canal. This may be regularly observed in temporal bones after radical mastoid operations.

SUMMARY

The anatomic aspects of the seventh nerve have been studied in bone specimens of adults and newborn infants. Serial sections of embryologic human and animal material at different ages have been examined.

During development and in postfetal life, it was observed, some sections of the seventh nerve canal were not being closed by bone but remained covered by connective tissue.

Some ganglionic cells remained in connection with the facial nerve outside the geniculate ganglion, producing a secondary ganglion in the course of the seventh nerve in the inner acoustic canal.

Dehiscences of the canal in the supratympanic portion above the oval window were not rare. Vascular anastomoses of the middle ear mucosa through present dehiscences were observed.

The facial nerve canal in its vertical segment was enlarged as a result of the presence of pneumatic cells and the connection with the lodge of the stapedius muscle. The seventh nerve exhibited a variable thickness of the perineurium and epineurium. The vascular arrangement and its division in the canal and in the nerve are discussed.

The exit of the nerve and the width of the canal were in no instance narrowed in the material studied.

The proposed and calculated landmarks of the exit of the nerve and of the vertical canal portion are discussed.

ZUSAMMENFASSUNG

Es liegt eine Untersuchung der anatomischen Verhältnisse des siebenten Hirnnervens an Knochenpräparaten von Erwachsenen und Neugeborenen vor. Serienschnitte menschlichen und tierischen embryologischen Materials verschiedenen Alters werden untersucht.

Es wurde beobachtet, dass sowohl im Entwicklungsstadium als auch im Leben nach der Geburt gewisse Abschnitte des Fazialiskanals keinen knöchernen Verschluss aufweisen sondern mit Bindegewebe bedeckt bleiben.

Einige Ganglienzellen blieben mit dem Fazialisnerven ausserhalb des Ganglion geniculatum in Zusammenhang und bildeten ein zweites Ganglion im Verlaufe des Nerven innerhalb des Gehörkanals.

Schlitzbildungen im supratympanischen Abschnitt des inneren Gehörkanals ober-

halb des ovalen Fensters waren keine Seltenheit. Gefössanastomosen der Mittelohrschleimhaut durch bestehende Schlitzbildungen wurden beobachtet.

Der Fazialiskanal war in seinem vertikalen Abschnitt erweitert als Folge des Bestehens pneumatischer Zellen und der Verbindung mit der Loge des Steigbügelmuskels. Der Fazialis wies eine wechselnde Dicke des Perineuriums und des Epineuriums auf. Die Anordung der Gefässe und ihrer Verzweigungen innerhalb des Kanals und des Nerven werden erörtert.

In keinem Fall des untersuchten Materials zeigten die Austrittsstelle des Nerven oder der Durchmesser des Kanals eine Verengung.

Es folgt eine Erörterung von Vorschlägen und Berechnungsmöglichkeiten zur Auffindung anatomischer Merkpunkte der Austrittsstelle des Nerven und des vertikalen Abschnitts des inneren Gehörkanals.

RESUMEN

Se estudian los aspectos anatómicos del séptimo nervio en huesos de adultos y niños recién nacidos. Se examinan las secciones seriadas del material humano y animal de ombriones a diferentes edades.

Durante el desarrollo y en la vida postfetal se observó que algunas secciones del canal del séptimo nervio no se encontraban cerradas por hueso sino que permanecían cubiertas por tejido conectivo.

Algunas células ganglionares permanecieron en conexión con el séptimo nervio afuera del ganglio geniculado, produciendo un ganglio secundario en el curso de dicho nervio en el interior del canal acústico.

Las dehiscencias del canal en la porción supratimpánica por encima de la ventana oval no son raras. Se observaron anastomosis vasculares de la mucosa del oído medio a través de dehiscencias. El canal del nervio facial en su porción vertical se encontró agrandado como resultado de la presencia de celdillas neumáticas y la conexión con el tabique del músculo estapedio. El séptimo nervio exhibió un grosor variable del perineuro y epineuro. Se discuten las disposiciones vasculares y su división en el canal y en el nervio.

La salida del nervio y la amplitud del canal no se encontraron en ningún caso estrechados en el material estudiado.

Se discuten los límites propuestos y calculados para la salida del nervio y de la porción vertical del canal.

RÉSUMÉ

Les aspects anatomiques du 7e nerf cranien ont été étudiés sur des spécimens d'os d'adultes et de nouveaux-nés. Des coupes en séries de matériel embryologique de l'homme et de l'animal à différents âges ont été examinées.

Durant la période de développement et de la vie post-foetale quelques-unes des coupes du canal du 7e nerf n'étaient pas entourées de tissu osseux, mais recouvertes de tissu conjonctif.

Quelques cellules ganglionnaires restaient en contact avec le nerf facial en dehors du ganglion géniculé, provoquant un ganglion secondaire dans le trajet du 7e nerf à l'intérieur du canal acoustique.

Les déhiscences du canal dans la partie supratympanique, au dessus de la fenêtre ovale, ne sont pas rares. Des anastomoses de la muqueuse de l'oreille moyenne à travers ces déhiscences ont été observées.

Le canal du nerft facial était élargi, en raison de la présence de cellules pneumatiques et de la communication avec la loge du muscle de l'étrier. Le périnèvre et

l'épinèvre du 7e nerf présentaient une épaisseur variable.

La configuration vasculaire et sa division dans le canal et dans le nerf sont discutées.

Les auteurs n'ont observé aucun cas de rétrécissement de l'émergence du nerf ou du canal dans le matérial étudié.

Les points de repère proposés et calculés de l'émergence du nerf et de la portion du canal vertical sont analysés.

SUMARIO

Os aspetos anatômicos do 7° nervo têm sido estudados em peças ósseas de adultos e de recém-nascidos. Cortes têm sido examinados em série, de material humano e animal em evolução embriológica, em fases diferentes.

Durante o desenvolvicento e na vida pós-fetal, foi observado que alguns cortes do canal 7° nervo não estavam sendo fechados por osso, permanecendo cobertos por tecido conjuntivo.

Algumas células ganglionares permaneciam em conexão com o nervo facial, fora do gânglio geniculado, formando um gânglio secundário no decurso do 7° nervo no canal acústico interno.

Não foram raras as deiscências do canal na parte supra-timpânica, acima da janela oval. As anastomoses vasculares da mucosa do ouvido médio foram observadas através das deiscências presentes.

O canal do nervo facial apresenta-se aumentando no seu segmento vertical, devido a presença de células pneumáticas e sua conexão com a loja do músculo estapédio. O 7° nervo apresentava uma espessura variável do perinervo e epinervo. São discutidas a disposição vascular e sua divisão no canal e no nervo.

A saída do nervo e a largura do canal não se apresentavam estreitadas no material estudado.

Os pontos de referência propostos e calculados para a saída do nervo e da porção vertical do canal são discutidos.

RIASSUNTO

Si tratta di uno studio dell'anatomia del nervo facciale praticato su neonati ed adulti. Furono esaminate sezioni seriali di materiale embriologico umano ed animale a differenti stadi di sviluppo. Durante lo sviluppo e nella vita post-fetale si ebbe modo di osservare che il canale del nervo facciale non era ancor chiuso da osso, ma da tessuto connettivo. Alcune cellule ganglionari rimanevano in rapporto col nervo facciale al difuori del ganglio genicolato, producendosi così un altro ganglio lungo il decorso di detto nervo nella porzione più bassa del canale acustico. Non raramente si videro deiscienze del canale nella sua porzione sovra timpanica, prima del foro ovale; e attraverso tali deiscienze si osservarono anastomosi vascolari con la mucosa dell'orecchio medio. Si osservò pure un aumento del canale del nervo facciale nel suo tratto verticale, in rapporto alla presenza di cellule pneumiche e alla loggia del muscolo stapedio. Diverso fu lo spessore del perinervo e dell'epinervio del settimo. Viene discussa la disposizione della vascolarizzazione del canale e del nervo. Il calibro del foro d'uscita e del canale non furono mai riscontrati distretti nel materiale studiato. Vengono discussi i punti di repere per la determinazione del foro d'uscita del nervo e del tratto verticale del suo canale.

Author's Note: It is a pleasure to express my gratitude to Mrs. Marie Ikenberg for the completion of the photomicrographs and to Dr. Colette Jeantet and Dr. Andreas Kodros for the preparation of anatomic sections and drawings.

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Electrodiagnosis of Lesions of the Facial Nerve*

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THE physician confronted by a patient with a lesion of the facial nerve is often in a quandary as to the actual status of the nerve. From paralysis of the face there may be a recovery within six weeks with no residual weakness; or recovery may occur within six months with little to considerable weakness; or it may occur in six months to a year, usually with considerable residual deformity, or it may never recover. The earlier the physician recognizes the pathologic condition of the facial nerve, the sooner he may apply rational therapeutic measures and thereby increase the chances of a favorable outcome.

Two combined technics of electrodiagnosis are considered adequate for assessing the status of the facial nerve. The faradic-galvanic test (reaction of degeneration) serves as a rough screening process, whereas electromyographic study is used for more precise information.

The Faradic-Galvanic Test.—The faradic-galvanic test is a study of the response of the nerve and its corresponding muscles to two types of currents percutaneously applied. This principle of electrodiagnosis was first studied by Duchenne and further developed by such men as Erb, Remak, Pfluger, DuBois, Reymond and Babinski.[1] Recently more accurate tests have been described, such as intensity duration tests,[2] the galvanic tetanus ratio, strength interval curves[3] and strength frequency curves.[4] Although admittedly these tests are more quantitative and give more information than do the faradic-galvanic test, they are not adequate in themselves and are more time-consuming; therefore they do not qualify as screening procedures when electromyographic testing is contemplated.

Technic of Test.—Detailed descriptions of the testing technics are available in standard textbooks on physical medicine[5] and will be outlined only briefly. Any approved generator of faradic and galvanic currents may be used. A large dispersive electrode may be placed on the back, the upper arm or the hand of the patient. The testing electrode is first placed over the nerve point of the facial nerve trunk just anterior to the tragus, and the threshold value, which is the minimal intensity of current required to obtain a liminal response, is determined first for the unaffected side and then for the involved side. These values should be noted for both the faradic or "tetanizing" current and the galvanic current (constant, voltaic, or "twitch" current). The upper, middle and lower branches should also be tested separately. Finally, representative muscles in each area are tested directly.

Explanation of Test.—When lower motor neurons are damaged or destroyed by trauma or disease, that part of the nerve fiber which is distal to the injury degenerates until there remains only a nucleated fibrous cord. The muscle fiber to which the nerve fiber is attached becomes atrophied and toneless. These changes are designated as *wallerian* [illegible]

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Oct. 20, 1954.

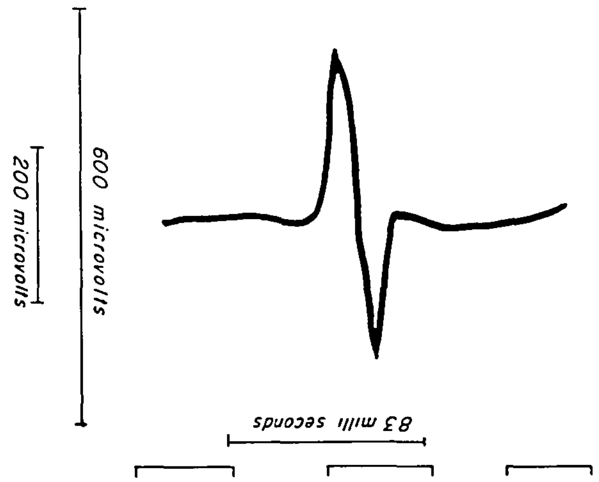

Fig. 1.—Normal motor unit. Characteristics: form, usually triphasic or diphasic; amplitude, 100-2000 microvolts; duration, 2-10 milliseconds; interpretation, actual potential of normal motor unit. (This motor unit projected from 35 mm. continuous run film at speed of 12 inches per second.)

electric test is performed in order to determine whether the muscles react normally or whether they react as muscles do when subject to wallerian degeneration. This is referred to as the "test for reaction of degeneration" (often abbreviated RD). If the lesion is central (that is, in the upper motor neuron), wallerian degeneration does not take place. The muscle is not denervated, but it is paralyzed because involuntary impulses from the cerebral cortex cannot pass the lesion in the upper motor neuron.

In lesions of the lower motor neuron, stimulation of a degenerated nerve by any type of current will not cause the muscle to contract. Application of the faradic current to the muscle will not cause it to contract because, when the nerve is not functioning, any single faradic impulse is too short to produce response from the denervated muscle. But if the constant current is applied to the muscle there will be a response. The muscle possesses the inherent ability to respond to external stimuli even though its nerve supply is destroyed; but the muscle alone is not so sensitive as it is when its nerve supply is intact. Whereas the faradic impulses are too brief to cause contraction, the constant current will continue to flow until the muscle finally responds.

In the presence of reaction of degeneration there will also be hyperexcitability of the muscle to galvanic stimulation. This is explained by the assumption that in normal muscles the motor nerves exert an inhibitory effect on the muscle they innervate, and this effect is absent in cases of denervation.

Description of Tests.—The faradic (induced or tetanizing) current, when applied to a *normal nerve,* produces a tetanic contraction of the muscles innervated by that nerve. The contraction is vigorous to a degree depending on the intensity of the current and is sustained as long as the current is applied. When it is applied to the motor point of a *normal muscle* it produces similar responses. When it is applied to a *denervated nerve,* however, there is no response in the muscles, provided the test is done five to fourteen days after denervation. When it is applied to a *denervated* muscle there is no response.

The galvania (voltaic, constant or twitch) current, when applied to the *nerve point* of a *normal nerve,* produces a *brisk twitch* contraction of the corresponding muscles (tetanus is not produced ordinarily). *Normal relations* exist between the responses at the negative pole, i.e., the response is greater when the stimulating electrode is cathodal rather than anodal, and a normal quantity of current is required to obtain the desired response. When applied to the motor point of a normal muscle, it produces responses similar to those aforementioned, with respect to the quality of contraction (brisk), the polar relation and the quantity of current. When applied to a denervated nerve, regardless of the intensity of the current, there is no response whatever in the corresponding muscles. One must beware of misinterpreting current "splash" at high intensities causing responses in nearby uninvolved muscles. Partially denervated nerves may give responses, but only with increased intensities of current. When the current is applied to a denervated muscle (at least five days after the onset) there is a very sluggish ("vermicular") response in the muscle; the polar relation may be altered (i.e., reversed or equal or not affected), and very early less current than normal may be required (later greater current than normal is required). Best responses are obtained at or near the tendon end of the muscle (longitudinal response).

The observations on the reaction of degeneration are designated as (1) no R.D.; (2) mild partial R.D.; (3) severe partial R.D.; (4) full R.D., and (5) absolute R.D. *No. R.D.* indicates that the responses to both currents in the facial nerve and the facial muscles are present. Hypoexcitability or hyperexcitability may be present, but innervation is intact. *Mild partial R.D.* means that there is a decrease in both faradic and galvanic response in the nerve and a decrease in the response of the muscle to the faradic current, usually with an increased excitability of the muscle to the galvanic. Polar relations may be altered. In *severe partial R.D.,* these changes are more pronounced. In *full R.D.* the nerve does not respond to either current, and after an initial period of hyperexcitability (in our experience two to seven days) the muscle will not respond to faradic current at the highest intensity tolerated by the patient. The muscle responds to galvanic stimulation, but with qualitative, quantitative and polar changes. Quantitatively, initially there is increased excitability, responses being obtained with as little as one third of the amount of current normally required. With the passage of time the muscle loses its excitability and requires more than normal current. Qualitatively, the muscles respond slowly ("vermicular" response) as compared to the brisk, lightning-like normal response, and finally the polar relation may be reversed or altered. In the presence of *absolute R.D.* no responses are obtained to either current, either in the facial nerve or in the muscles.

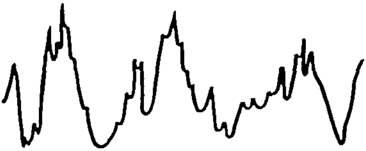

Fig. 2.—Interference pattern.

When the test is performed at about the second or third week after the onset, we have observed in cases of Bell's palsy that the test has reliable prognostic significance. If the test is performed after the first month or more it is not a reliable prognostic procedure, because responses to the electrical stimuli lag behind and do not correlate with the degree of nerve regeneration.

Clinical Significance of the Reaction of Degeneration.—This reaction serves to distinguish severe peripheral nerve lesions from minor ones, differentiates hysterical paralysis from peripheral nerve lesions and distinguishes upper from lower motor neuron disease (there is no R.D. in the presence of lesions of the upper motor neuron). Its most important role is played, however, as an aid in prognosis. *If there is no R.D.,* recovery should occur within a few weeks. *If there is partial R.D.,* recovery may occur within a few months (depending on the severity of the condition, the distance over which nerve must regenerate, the presence of complicating factors, etc.). If [illegible] is [illegible] D.,

TABLE 1.—*Reliability of Faradic-Galvanic Testing in 15 Cases of Bell's Palsy for Purposes of Prognostication (from Study Group)*

No.	*Patient*	*Sex*	*Age*	*Duration of Symptoms at Time of Initial Testing*	*R.D.*	*Clinical Outcome*
1.	P.S.	M	59	18 days 16 days	None	About 80% recovery noted after 4 weeks Rx, 95% recovery at 11 weeks
2.	I.S.	M	64	7 days 14 days	Moderately severe partial	About 15% recovery noted 4 weeks after onset; No further follow-up
3.	H.A.	M	54	30 days	Full (Ramsey Hunt)	30% return of function 17 months after onset
4.	B.D.	F	64	90 days	Mod. severe partial	No change in function (40%) 6 mo. after onset
5.	M.D.	M	62	7 days 21 days	None	10% recovery in 3 weeks; Seen 6 months later when he had had complete recovery for some time
6.	E.L.	F	30	5 days 21 days	None	Complete recovery after 5 weeks
7.	J.M.	M	64	14 days	None	15% improvement 24 days; 30% improvement 31 days
8.	K.M.	M	48	7 days 14 days	None	20% recovery in 3 weeks; upper & lower portions returning first
9.	L.M.	F	58	7 days 14 days	None	100% recovery in 5 weeks
10.	I.R.	M		7 days 14 days	None	50% recovery in 3 weeks
11.	A.F.	F	38	31 days	Mod. partial	90% recovery in 5 months
12.	A.M.	M	31	17 days	Mild partial	40% recovery in 5 weeks
13.	I.P.	M	25?	14 days	None	15% recovery in 14 days; 100% recovery in 4 weeks
14.	I.B.	M	50?	30 days	Severe partial	40% recovery in 10 mo. Mass action
15.	G.I.	F	48?	8 years	Full	No recovery. Excessive sagging of face

recovery may take six months to more than a year or may never occur, depending upon the etiologic and associated factors. If there is *absolute R.D.*, it means there is no contractile tissue; therefore, recovery cannot occur. Exceptions are periodic familial paralyses and severe edema of muscle fibers.

However, in view of much that is known, the test has its limitations. First, the reaction does not develop until five to fourteen days after onset, so that one must be content with clinical evaluation very early. Second, it cannot be correlated with clinical progress later; in fact, it lags. With due respect to the method, it is used primarily as a screening test since electromyographic procedures have become better understood.

Electromyographic Method. — Electromyography may be defined as the study of the intrinsic electrical properties of muscle. The technic[6] employed in our work consists of inserting a needle electrode directly into the muscles to be studied and leading this off to a suitable am-

TABLE 2.—*Electromyographic Study as a Diagnostic Aid*

							E.M.G.		
No.	*Patient*	*Sex*	*Age*	*Duration of Symptoms at Initial Test*	*Diagnosis*	*R.D.*	*Rest (Fibrillation Potential)*	*Effort (Normal Motor Unit Potential)*	*Clinical Course*
1.	S.S.	M	33	12 weeks	Bell's	Full	Rare	Discrete	No clinical return at 3 mo.; predicted some return at about 4 mo.; confirmed
2.	A.B.	M	58	7 weeks	Bell's	Severe partial	Many	Few	60% return at 6 months
3.	B.G.	F	33	3 weeks	Fenestration (immediately after surgery)	Full	Few to moderate	None	Decompressed 6 weeks after onset; complete recovery 4 mo. after decompression
4.	V.J.	F	39	7 years	Bell's	Full	Few to moderate	Rare	Fascia lata sling operation with good results (good movement & symmetry at mouth angle)
5.	T.G.	F	36	12 weeks	Bell's	Full	Moderate	Few	50% recovery at 9 months
6.	J.Y.	F	21	3 weeks	Fenestration (immediately after surgery)	Full	Many	None	Decompression 24 hours after onset; no evidence of return of function at time of test
7.	R.N.	M	38	3 weeks	Bell's	Full	Many	None	Predict trace of function 4 months
8.	W.T.	M	50	9 months at anastomosis	Basal skull fracture with peripheral facial paralysis	1. Severe partial (lower) 2. Full (middle & upper)	Many	None	No function
				6 months after anastomosis	Anastomosis of XI with VII	Feeble response to faradic	Rare	Many (low voltage)	Evidence of reinnervation; function present only on shrugging shoulder
9.	S.S.	F		4 months after surgery	Acoustic neurinoma removed	Full (no response to faradic)	Many	None	No function
				6 months after anastomosis	Anastomosis of XI with VII	Feeble faradic response	Rare	Few	Evidence of neurotization—no clinical function
				12 months after anastomosis		Faradic and galvanic response improved	None	Many	Complete function when shrugging shoulder; improved symmetry

plifier and then to an "audio unit" and an oscilloscope.

Action potentials in the facial musculature are of shorter duration than those of the limbs or trunk.[6a] Furthermore, the normal "relaxation [illegible]" [illegible] in other parts of the body is obtained with considerable difficulty in the face. Another peculiarity of the face is the pickup of distant activity, which usually comes from the uninvolved side of the face during effort, or from adjacent muscles innervated by the normal fifth nerve. All of these characteristics confuse the inexperienced and serve to make facial electromyography truly the domain of the most experienced.

However, in skilled hands electromyographic study yields basic information which should give the clinician the best possible understanding of his patient. Normally, periods of electrical silence may be obtained when the patient attempts to relax or rest the face. If this is not obtainable, the experienced electromyographer can tell whether the action potentials observed do or do not have pathologic significance. With minimal contraction effort, many action potentials (normal motor units, see Figure 1) of short duration are noted. The normal motor unit potential may be diphasic, triphasic and occasionally polyphasic; 2 to 10 m.s. in duration, and 100 to 2,000 microvolts in amplitude. With maximum effort a summation effect is seen and the so-called interference pattern is recorded (Fig. 2). The total contraction pattern consists of electrical silence, a burst of action potentials with sustained voltages and then a cessation of electrical activity with relaxation.

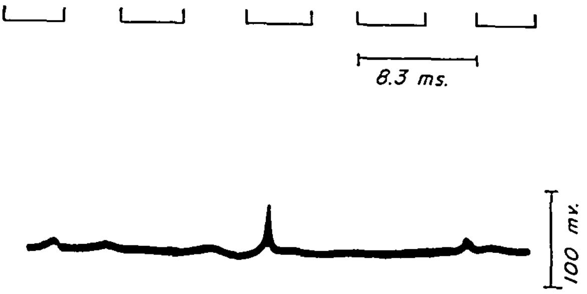

Fig. 3.—Fibrillation pattern. Characteristics: form, monophasic or diphasic; amplitude, 10-100 microwatts; duration, .05-20 minutes; interpretation, denervation potential. (12 minutes and 1 second.)

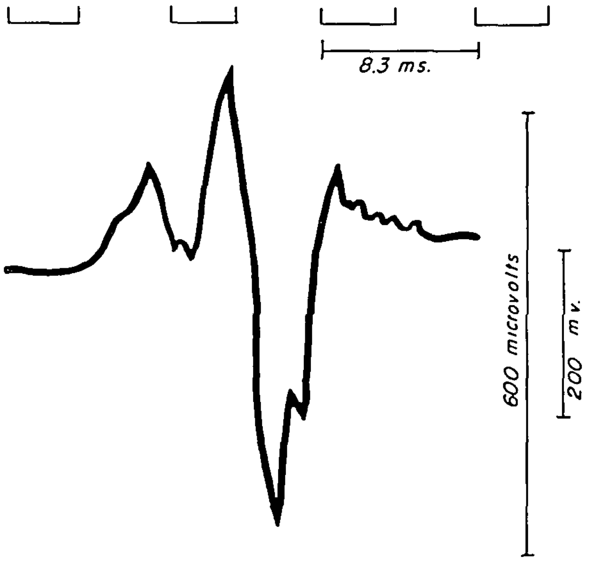

Fig. 4.—Polyphasic unit. Characteristics: form, more than 5 phases; amplitude, 20-1200 millivolts; duration, 5-20 minutes; interpretation, usually present eight weeks prior to clinical evidence of regeneration. (Some 12 minutes plus.)

If wallerian degeneration has taken place in the facial nerve, then, at rest, there are recorded the spontaneously occurring fibrillation potentials (Fig. 3). These usually develop fourteen to eighteen days after the onset. Their presence indicates a poorer prognosis. With effort *there will be no change in the pattern* (if denervation is truly complete) except insofar as distant electrical activity from the opposite side of the face or occasionally from the masseter or temporalis may influence the pattern. Such activity has a muffled sound on the audio, and the potentials are somewhat attenuated in appearance on the oscilloscope. The earliest sign of regeneration is the polyphasic nascent unit (Fig. 4), which signifies a good prognosis. This unit appears on an average of eight weeks before there is clinical evidence of recovery. Other signs of regeneration are disappearance of the fibrillation potential and the gradual appearance and increase in the number of normal motor unit potentials.

When there is physiologic block without nerve degeneration, the electromyograph reveals electrical silence during rest as well as during effort, whereas the nerve and muscles respond to both tetanizing and twitch currents, though the responses are more feeble. The prognosis should be good unless the blocking mechanism becomes increasingly severe and leads to wallerian degeneration. This condition is found when there is no electrical reaction of degeneration. However, it has also been observed in the presence of full reaction and provides an example of the greater value of electromyographic study as compared to the faradic-galvanic test or other electrodiagnostic tests.

The reliability of the faradic-galvanic test is shown in Table 1, in which 15 cases of Bell's palsy were reviewed from a study group in order to show the variability of prognostication. Table 2 presents the reaction of degeneration to electromyographic study and indicates the precise information advantageous to the more accurate prognosis supplied by the latter test.

SUMMARY

Electrodiagnostic methods for objectively testing the status of the facial nerve are described. The test for the "reaction of degeneration" is used for screening. When this test reveals no "reaction of degeneration" the prognosis is considered good, and no further examination is considered necessary. When there is partial or full "reaction of degeneration" in the facial nerve, further examination by electromyographic means is necessary.

Electromyographic study of the face has certain special features that make it more difficult than similar study of other parts of the body. Some of these features are discussed and serve to emphasize the importance of the fact that this procedure should be undertaken only by experienced electromyographers.

When there are only action potentials of denervation fibrillation, with the patient consciously attempting to relax or to contract the facial muscles, and all three areas of the face are sampled, this is consistent with complete neuraxis cylinder degeneration, and a poor (or less favorable) prognosis is evident. A mixture of fibrillation potentials (at rest) and motor unit potentials (with effort) indicate a partial lesion and consequently a more hopeful prognosis. The earliest signs of regeneration are the disappearance of fibrillation potentials and the presence of polyphasic or nascent units during effort.

Cases are cited to illustrate the use of electrodiagnosis and to pinpoint the conclusion that only by means of such objective testing technics can the physician expect to approach the problem of injury to the facial nerve scientifically.

ZUSAMMENFASSUNG

Es werden elektrodiagnostische Methoden zur objektiven Prüfung des Zustandes des Fazialisnerven beschrieben. Die Prüfung auf degenerative Reaktion wird zum Zwecke der Aussiebung der Fälle benützt. Zeigen sich keine degenerativen Reaktionen, so wird eine günstige Prognose angenommen und eine weitere Untersuchung für überflüssig gehalten. Wenn eine teilweise oder völlige degenerative Reaktion im Fazialisnerven festgestellt wird, ist eine weitere Untersuchung mittels Elektromyographie erforderlich.

Die elektromyographische Untersuchung des Gesichts ist mit gewissen Besonderheiten verbunden, die sie schwieriger machen als ähnliche Untersuchungen an anderen Körperteilen. Einige dieser Besonderheiten werden erörtert und zwingen zur Hervorhebung der Tatsache,

dass die Ausführung dieser Untersuchung ausschliesslich erfahrenen Spezialisten überlassen bleiben muss.

Wenn die Untersuchung aller drei Fazialisgebiete bei einem Kranken, der bewusst versucht, die Gesichtsmuskeln zu entspannen oder zu kontrahieren, nur Aktionsspannungen oder Denervationsfibrillierung ergibt, lässt sich auf eine völlige Degeneration des Achsenzylinders schliessen, und die Prognose ist schlecht oder zumindest weniger günstig. Eine Mischung von Fibrillationsspannungen (bei Ruhe) und Bewegungsspannungen (bei Anstrengung) deutet auf eine Teilschädigung und bietet daher eine hoffnungsvollere Prognose. Die ersten Anzeichen von Regeneration sind das Verschwinden der Fibrillationsspannungen und das Auftreten mehrphasiger oder im Entstehen begriffener Spannungseinheiten bie Muskelanstrengung.

Es werden Fälle zur Erläuterung der Anwendbarkeit der Elektrodiagnose angeführt, die beweisen, dass der Arzt nur von einem solchen objektiven Prüfungsverfahren einen wissenschaftlichen Zugang zum Problem der Fazialisschädigungen erwarten kann.

SUMARIO

São descritos métodos eletro-diagnósticos para testar objetivamente o estado do nervo facial. A reação de degeneração é usada como guia. Quando êste teste não revela "reação de degeneração," o prognóstico é considerado bom, não sendo necessário qualquer outro exame. Quando há "reação de degeneração" parcial ou total no nervo facial é necessário novo exame por meios eletro-miográficos.

O estudo eletro-miográfico da face apresenta certos aspetos especiais, que o tornam mais digícil do que estudos similares de outras partes do corpo. Alguns dêsses aspetos são discutidos e servem para salientar que tal método só deve ser pesquisado por quem tem experiência.

Quando há apenas potenciais de ação de fibriliação de desnervação, tentando o paciente conscientemente relaxar ou contrair os músculos facais, tal achado indica degeneração completa do neuro-eixo e máu prognóstico (ou menos favorável), tornase evidente.

U'a mistura de potencias de fibrilação (em repouso) e de potenciais de unidade motora (com esforço) indicam uma lesão parcial, e conseqüentemente, um melhor prognóstico. Os sinais mais precoces da regeneração são desaparecimento dos potenciais de fibrilação e a presença de unidades polifásicas ou nascentes durante o esforço.

São citados casos que ilustram o uso do eletro-diagnóstico e salientam que apenas por meio de tais testes objetivos pode ser o problema da lesão do nervo facial encarada cientìficamente.

RÉSUMÉ

L'auteur décrit lesméthodes d'électro-diagnostic pour l'étude du status du nerf facial. Le test pour la réaction de dégénérescence est utilisé comme écran. Lorsque ce test indique: pas de "réaction de dégénérescence," le pronostic est bon, et un examen secondaire est superflu. Lorsque'on se trouve en présence d'une "réaction de dégénérescence" positive, partielle ou totale du nerf facial, un examen par les méthodes électromyographiques est indispensable.

L'étude électromyographique de la face est plus délicate que celle d'autres parties du corps. Certains difficultés de cette étude sont étudiées. Elle ne devrait être pratiquée que par des électromygraphes expérimentés.

Lorsqu'il n'y a que des potentiels d'action de dénervation fibrillaire, alors que le patient fait des efforts de décontraction

ou de contraction des muscles faciaux (examen des trois zones faciales), on se trouve en présence d'une dégénérescence totale du cylindraxe, et le pronostic est nettement moins bon. Une combinaison de potentiels de fibrillation (au repos) et d'unité motrice (lors de l'effort) indiquent une lésion partielle; le pronostic est bon. Les signes de régénérescence les plus précoces sont la disparition des potentiels de fibrillation et la présence d'unités polyphasiques ou naissantes durant l'effort.

Des cas illustrent l'utilisatiton de l'électrodiagnostic, qui permettent de conclure que seuls des examens techniques et objectifs de ce genre peuvent permettre l'étude scientifique des lésions du nerf facial.

RESUMEN

Se describen los métodos electrodiagnósticos para probar objetivamente el estado del nervio facial. Se usan como prueba gruesa la reacción de degeneración. Cuando no se encuentra reacción de degeneración se considera un buen pronóstico y no se hacen exámenes posteriores. Cuando se encuentra reacción de degeneración parcial o total se requieren exámenes posteriores por métodos electromiográficos.

Los estudios electromiográficos tienen ciertas particularidades que los hacen más difíciles en la cara que en otras partes corporales. Se discuten estas particularidades que sirven para señalar el hecho de que este procedimientos debe hacerse solamente por electromiografistas experimentados.

Cuando existen únicamente potenciales de acción de fibrilación de la desnervación, cuando el paciente intenta concientemente relajar o contraer lo músculos faciales y se prueban todas las áreas de la cara, se demuestra una degeneración cilíndrica neuroaxial completa y es evidente un pronóstico menos favorable. La mezcla de los potenciales de fibrilación (en descanso) y los potenciales motores (con esfuerzo) indica una lesión parcial y por ende un pronóstico más favorable. Los primeros signos de regeneración son la desaparición de los potenciales de fibrilación y la presencia de unidades polifásicas durante el esfuerzo.

Se citan casos para ilustrar el uso del electrodiágnóstico y la conclusión de que únicamente po rdichas pruebas objetivas el médico puede abordar el problema de la lesión del nervio facial en una forma científica.

RIASSUNTO

Vengono descritti metodi elettrodiagnostici che consentono di obbiettivare lo stato del nervo facciale. Quando può essere esclusa la presenza di una "reazione degenerativa" la prognosi può considerarsi buona e non c'è bisogno di altir esami. Quando invece la "reazione degenerativa" è parzialmente o del tutto positiva sono necessarie ulteriori ricerche elettromiografiche. Tali ricerche, nella faccia, sono molto più difficili a farsi delle similari condotte nelle altre parti del corpo. Vengono discusse alcune loro tecniche in mod o da sottolineare l'importanza che tali ricerche vengano eseguite soltanto da personale altamente specializzato, e vengono descritti alcuni loro dati che permettono di porre una esatta diagnosi delle lesioni in istudio e la prognosi che se ne deve trarre. Vengono anche descritti i segni precoci della rigenerazione nervosa. Si citano, infine, casi che illustrano l'uso della elettrodiagnosi e portano alla conclusione che soltanto con tale mezzo il medico può affrontare scientificamente il problema delle lesioni del nervo facciale.

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We have come to the moment when we must decide whether friendship or violence is to determine our relationships with other peoples.

We have reached the stage of rendering lip service to the concept of peace. We all say that we are working for it, but our words and our actions point in different directions, so that we are like a man trying to ride two horses, each going in an opposite direction. This is impossible . . . We have studied the laws of science, but we have neglected the laws which are essential to a good life. Rather do we find that men are anxious to harness newly found power, given to them by science, to the fulfillment of their own selfish desires, interests, or cruel projects. For they have not yet learnt what today's chaos should surely have taught them, that the laws of the moral world are as binding as those of the material, and that we can no more expect to be whole in mind and soul, if we do wrong, than we can be well in body if we overeat and overdrink. And especially now that science has brought our world so near together, nations are as dependent on their fellow nations for their welfare and prosperity as are individuals in a family or town.

—*Fry*

Topognosis of Lesions of the Facial Nerve

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IN his famous textbook on Diseases of Ear, Nose, and Throat, Dr. Francis Lederer emphasizes the importance of locating the site of the lesion in cases of facial paralysis. This may provide valuable information concerning the cause, prognosis and treatment.

The purpose of my discussion is to describe and analyze, on the basis of anatomic factors, eight syndromes possibly associated with facial paralysis, each significant for a specific level.

Motor Neurons.—The first question to be answered in a case of facial paralysis is: Does the lesion affect the upper or the lower motor neuron? The former is represented by the connection between the cortical center for voluntary movements of the face with the opposite pontine nucleus of the facial nerve. This nucleus is considered to consist of an upper and a lower portion. From the upper portion originate the neuraxons for motor nerve supply of the three forehead muscles, namely, the frontalis, the superior portion of the orbicularis oculi and the corrugator supercilii. From the lower portion of the nucleus the remainder of the facial neuraxons originate. The upper motor neuron, also called the crossed corticobulbar-nuclear tract, is connected with both the upper and the lower portion of the facial nucleus. The lower motor neuron transmits the stimulus from the nucleus through the motor nerve fibers to the muscles in the periphery. Thus, the upper motor neuron represents the bridge between the inceptor organ (the motor cortex) and the opposite receptor organ (the pontine nucleus). The lower motor neuron between the receptor and effector organs of the same side.

Additional Neurofacial Pathways.—In addition to the crossed corticobulbar tract, there are several other pathways connecting various neural structures with the facial nerve at or below the nucleus. These connections, of course, are not affected by lesions of the upper motor neuron, and preservation of their function represents the syndrome of the upper motor neuron lesion.

These connections are:

A. *Nuclear pathways:*
   1. The uncrossed corticobulbar tract. It connects the motor cortex with the ipsilateral nucleus; this connection, however, is restricted to the upper portion of the nucleus, which provides motor nerve supply for the three muscles of the forehead.
   2. A thalamonuclear tract from the assumed centers of emotion in the thalamus and adjacent structures, responsible for emotionally induced movements of the muscles of expression.
   3. Connections responsible for the neurofacial reflexes, particularly the stapedius reflex and the blinking reflex. The afferent limb of the former originates in acoustic nuclei, the afferent limb of the latter in acoustic, optic and trigeminal nuclei.

B. *Infranuclear connections:*
   These include:

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Oct. 20, 1954.

1. Motor fibers originating in the hypoglossal nucleus innervating the orbicularis oris.
2. Preganglionic secretory fibers originating in the upper salivary nucleus coursing with the nervus intermedius and synapsing in the sphenopalatine and submaxillary ganglia. They provide motor nerve supply for several glandular structures, as will be shown later.
3. Sensory fibers originating in the geniculate ganglion, providing taste and probably common sensation for the anterior two thirds of the tongue. The suprageniculate course of these fibers will likewise be discussed later.

Characteristics of Lesions of the Upper Motor Neuron.—As a result of these anatomic factors, the following functions obviously are preserved in lesions of the upper motor neuron:

1. Wrinkling of the forehead and closure of the eye (absence of Bell's phenomenon)
2. Emotionally induced action of the muscles of expression. (Absence of hemifacial dissociation of emotional expression, which I like to call the "Janus face phenomenon." Janus, the god of all beginnings, was pictured with two faces, one crying and one smiling.)
3. Blinking reflex
4. Stapedius reflex
5. Orbicularis oris. (Symmetric pursing or puckering of the lips and undisturbed pronunciation of blastic labials.)
6. Lacrimation.
7. Taste sensation on the anterior two thirds of the tongue.

I wish to emphasize the fact that preservation of any one of these functions except the emotionally induced movement of the muscles of facial expression may also occur in the presence of lower motor neuron lesions when they are located either above the entrance or below the exit of the nerve fibers responsible for the function in question.

Particularly, preservation of the action of the forehead muscles may occur in the presence of peripheral lesions under the following conditions:

1. Incomplete recovery from Bell's palsy.
2. Nuclear lesions restricted to the lower portion. (I have observed recently a case of poliomyelitis with preservation of the movements of the forehead muscle group.)
3. Extracranial injury (tumor, accident, operation) involving only the inferior division of the facial nerve. In these cases the angle of the mouth drops, except when the lesion is restricted to the cervical branch. This occurs frequently in radical neck dissections and submaxillary surgical procedures. In the latter instances the angle of the mouth is raised on the paralyzed side, owing to isolated paralysis of the triangularis oris (depressor angula oris). This is an upward extension of the platysma muscle. I should like to mention that there also exists a downward extension of the platysma beyond the clavicle, responsible for voluntary movements of the breast as sometimes rhythmically performed by night club dancers. Interestingly enough, this grotesque aberration of Terpsichore depends largely on the function of the seventh cranial nerve.

Thus the only absolutely reliable functional sign of a lesion of the upper motor neuron is the preservation of emotional expression.

Lower Motor Neuron.—The lower motor neuron represents the bridge between the receptor organ in the pons and the effector organs in the periphery. The motor neuraxons, after their origin in the pontine nucleus, loop around the nucleus of the sixth nerve and leave the pons at its inferolateral border. They then enter into the inner auditory meatus with the nervus intermedius and the eighth nerve. Separating from the latter, they enter the fallopian canal and pass through the geniculate ganglion located at the horizontal knee. The fibers of the two nerves gradually intermingle intimately. The facial nerve then courses laterally and backward and then, behind the tympanic cavity, straight downward. It leaves the skull at the stylomastoid foramen, curving into the parotid gland, where it bifurcates into an upper and lower division with several subdivisions, forming the parotid plexus. The facial nerve in its course to the periphery forms several branches, some of them composed of fibers that do not originate in the pontine nucleus and serving functions different from those of the somatic motor fibers. The functions subserved by these branches are, of course, not interfered with when the lesion of the seventh nerve is above their entrance into, or below their exit from, the main trunk. It will be shown that the simultaneous presence or absence of all or of some of the functions provided by the branches of the facial nerve constitute seven different syndromes, each of them significant for a lesion at a different level.

Branches. — A brief review of the branches of the facial nerve and their functions relevant to our topognostic studies is appropriate.

1. The greater superficial petrosal nerve. It leaves the main trunk at the side of the geniculate ganglion. It consists mainly of preganglionic secretory fibers that originate in the upper salivatory nucleus, somewhat distant from the somatic motor nucleus. These fibers course with the nervus intermedius close to the somatic motor fibers, gradually intermingling with them. These preganglionic fibers synaps in the sphenopalatine ganglion. Postganglionic neurons originating in this ganglion provide parasympathetic nerve supply for the lacrimal gland, the nasal mucosa, and probably part of the palate. The presence of sensory fibers for the roof of the mouth is still debated.
2. Stapedius nerve. It innervates the stapedius muscle, which contracts reflexly in response to strong acoustic stimuli, pulling the footplate of the stapes out of the oval window. In this way the amplitude of the sound waves entering the inner ear is reduced and the sound intensity attenuated. This mechanism provides some protection to the inner ear against acoustic traumatization. Absence of the stapedius reflex manifests itself by an apparent increased loudness (*hyperacousis*) and by hypersensitivity to stronger intensities (phonophobia).
3. Chorda tympani. It carries three types of fibers: (a) preganglionic secretory fibers originating in the upper salivatory nucleus and synapsing in the submaxillary ganglion for the parasympathetic nerve supply of the salivary glands at the floor of the mouth; (b) sensory fibers for common sensation, and (c) sensory fibers for taste over the anterior two thirds of the tongue. Both originate in the geniculate ganglion and are connected with the solitary nucleus in the brain stem via the nervus intermedius. There is, however, reason to assume that some of the taste

fibers extend to the brain stem via pathways other than the nervus intermedius, since taste sensation, as a rule, is not affected by lesions of the facial nerve above the geniculate ganglion. There are controversial views concerning the course of these extrafacial taste fibers. Some regard the maxillary division of the fifth nerve, some the tympanic plexus by means of anastomoses with the geniculate ganglion, and some Jacobson's branch of the ninth nerve as the bridge to the brain stem.

Testing for taste sensation is of the utmost importance in facial topognosis, since common sensation and oral salivary glandular function cannot be reliably checked.

4. Digastric branch. This is the last branch of importance for differential topognosis. It leaves the main trunk below but close to the stylomastoid foramen. Immediately above the digastric branch is the posterior auricular nerve, which innervates the muscles of the auricle. The digastric branch innervates the posterior belly of the digastric and the stylohyoid muscle. The former is particularly involved in opening of the mouth. It is obvious that a lesion at or above the stylomastoid foramen will necessarily cause paralysis of this branch, while as a rule it will be spared by a lesion below the foramen. In paralysis of the digastric branch the jaw deviates to the healthy side on maximum opening of the mouth, and therefore the tongue, when protruded, appears closer to the angle of the mouth on the paralyzed side. This pseudodeviation of the tongue should not be confused with the real deviation characteristic of a unilateral hypoglossal lesion.

Deviation of the chin occurs also in paralysis of the motor fifth. It can easily be differentiated from the condition caused by digastric paralysis. In the latter, as has been mentioned, the chin deviates to the healthy side; in the former, to the paralyzed side. The external pterygoid muscle, which is responsible for this deviation, moves the mandible toward the opposite side.

Testing the functions of the muscles of the auricle, as was recommended by Erb for differentiating extrafallopian and introfallopian lesions, is useless, since the majority of persons cannot voluntarily activate these rudimentary muscles even under normal conditions.

On the basis of the foregoing discussion, the lower motor neuron of the facial nerve can be divided into seven parts:

1. Extrafallopian (infraforaminal). This is the most peripheral part of the nerve, below the branching of the ramus digastricus. Practically it can be regarded as identical with that portion of the nerve below its exit through the sylomastoid foramen.
2. Infrachordal. This is the part that courses from the stylomastoid foramen up to the branching of the chorda tympani.
3. Infrastapedial. This is the segment above the chorda tympani, as high as the branching of the stapedial nerve.
4. Suprastapedial. This is the part above the stapedial nerve, extending to the geniculate ganglion.
5. Transgeniculate. This is the portion of the nerve that passes through the geniculate ganglion.
6. Suprageniculate. This is the segment between the geniculate ganglion below and the motor nucleus above.

7. Nuclear. This part is represented by the somatic motor nucleus of the seventh nerve.

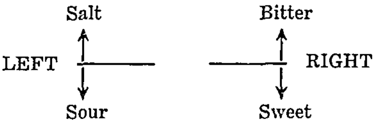
Application of the Scheme for Differential Topognosis of Lesions of the Lower Motor Neuron. — Lesions of the facial nerve located in any one of these seven segments are characterized by different syndromes, each significant for a different level, depending on the simultaneous presence or absence of all or of some of the functions provided by the branches as already described. Therefore one must check particularly for the following four functions:

1. Symmetric opening of the mouth, characterized by the midline position of the chin.
2. Taste in the anterior two thirds of the tongue.
3. Stapedius reflex.
4. Lacrimation.

The seven syndromes, correlated with the seven levels, are shown in the accompanying table.

Level	*Chin in Midline*	*Taste*	*Reflex Stapedius*	*Lacrimation*
Infraforaminal	Yes	Yes	Yes	Yes
Infrachordal	No	Yes	Yes	Yes
Infrastapedial	No	No	Yes	Yes
Suprastapedial	No	No	No	Yes
Transgeniculate	No	No	No	No
Suprageniculate	No	Yes	No	No
Nuclear	No	Yes	No	Yes

Technics of Testing.—Taste: The four cardinal taste qualities are tested by separate applications of saccharine solution, salt, quinine and vinegar upon the anterior portion of the tongue. The patient is asked not to withdraw the tongue during the application of each individual test substance, but to signalize the appearance of a taste sensation by raising or dropping the right or left hand in accordance with previous agreement, as for instance:



Involvement of the chorda tympani manifests itself by false and/or delayed responses in comparison with those obtained from the intact side.

Lacrimation: This is tested by irritating the nasal mucosa with chemical substances, such as kitchen ammonia or solution of formaldehyde, or mechanically by means of a cotton applicator.

Stapedius reflex: In previous years I used the strongest intensities (90 decibels and more) applied by means of the air receiver alternately to the ear on the "good" side and on the paralyzed side. In instances of stapedius paralysis this procedure was associated with considerable discomfort. Moreover, the danger of possibly causing acoustic trauma in an ear deprived of the protective stapedius reflex must be considered. For these reasons I restricted the use of this technic to instances of reduced hearing in the ear of the paralyzed side. For use in ordinary circumstances I have designed a technic that appears to be not only simple but harmless and informative; moreover, it dispenses with the need of an audiometer.

The Stethoscope Loudness Imbalance Test for Stapedius Paralysis.—A binaural stethoscope is placed in the patient's ears. A tuning fork of one of the middle frequencies is gently activated and placed in front of the bell. The patient with bilateral normal hearing hears the sound in both ears or in the midline. The second time the tuning fork is strongly activated. In the presence of stapedius paralysis the sound is lateralized to the ear on the p lyzed side, since the att ing effect of stapedius muscle contraction is missing.

This test is rather sensitive. By application of the air receiver of an audiometer to the bell and a gradual increase of the intensity I noticed that lateralization ensued at intensities of 45 decibels.

The Stethoscope Loudness Balance Test. —The same procedure can be used as a test for recruitment. In this technic, of course, lateralization, being present at mild intensities, disappears on binaural application of the strongest intensities, indicating the presence of loudness balance.

Limitation of the Presented Method of Topognosis. — The topognostic value of this method is restricted to early lesions. With lesions of longer duration partial recovery of one or another function may occur, or by descending degeneration some function may later be lost. Taste sensation may come back while the stapedius reflex is still absent. In the presence of tumors of the cerebellopontine angle (suprageniculate lesions) taste sensation is frequently absent, probably owing to descending degeneration. If these limitations are kept in mind, this discussion of possible syndromes may be helpful as a guide for locating the lesion in instances of facial paralysis.

COMMENT

The author discusses lesions of the facial nerve on the basis of eight possible syndromes possibly associated with facial paralysis. He describes the manifestations of lesions of the upper motor neuron, the numerous neural pathways connecting various neural structures with the facial nerve, and the characteristics of the upper motor neuron lesion, with criteria for its detection. Lesions of the lower motor neuron are dealt with in the same manner. A scheme for use in differentiating lesions of the upper motor neuron from those of the lower one at various levels is included, and several tests are described and recommended.

RÉSUMÉ

L'auteur discute l'étiologie, le pronostic des lésions du nerf facial, et souligne l'importance d'une localisation précise. Il décrit les symptômes des lésions du neurone moteur supérieur, les nombreux trajets nerveux reliant les différentes structures nerveuses au nerf facial ainsi que les caractéristiques des lésions du neurone moteur supérieur et la façon de les déceler. Il passe en revue de la même façon les lésions du neurone moteur inférieur. Il présente un schéma pour le diagnostic différentiel des lésions du neurone moteur supérieur et inférieur et décrit plusieurs tests recommandés.

RESUMEN

Se discuten las lesiones del nervio facial con énfasis perticular sobre la importancia de localzar el sitio de la lesión. Se describen las manifestaciones de las lesiones de la motoneurona superior, los diversos caminos nerviososque conectan otras estructuras nerviosas con el nervio facial, y las características de la lesión de la motoneurona superior, con el criterio para su observación. Se trata en igual forma la lesión de la motoneurona inferior. Se usa un esquema para diferenciar las lesiones superiores de las inferiores y se describen diversas pruebas que se recomiendan.

RIASSUNTO

L'autore prende in considerazione le lesioni del nervo facciale mettendo particolarmente in rilievo l'importanza di un'accurata determinazione della sede della lesione. Allo scopo egli descrive le manifestazioni delle lesioni del neurone motorio superiore, i numerosi circuiti ner-

vosi che connettono le varie strutture nervose col facciale e le caratteristiche delle lesioni del neurone motorio superiore con i relativi criteri diagnostici. Nella stessa maniera vengono trattate le lesioni del neurone motorio inferiore. Viene pure fornito uno schema per la diagnosi differenziale fra lesioni dei neuroni motorii superiore e inferiore, oltre a numerosi tests di sperimentato valore.

ZUSAMMENFASSUNG

Der Verfasser erörtert vom topognostischen, prognostischen und therapeutischen Standpunkt die Schädigungen des Fazialisnerven und hebt besonders die Bedeutung der genauen Lokalisierung des Sitzes der Erkrankung hervor. Er beschreibt in diesem Zusammenhang die Krankheitserscheinungen bei Schädigungen des oberen motorischen Neurons, die vielfachen Nervenverzweigungen, die die verschiedenen Gebiete des Fazialisnerven miteinander verbinden, die charakteristischen Eigenheiten der Schädigung des oberen motorischen Neurons und die Kriterien zu ihrer Erkennung. In gleicher Weise werden die Erkrankungen des unteren motorischen Neurons behandelt. Die Arbeit enthält ein Schema zur Differenzierung von Schädigungen des oberen und unteren Motorneurons und eine Beschreibung einiger empfehlenswerter Untersuchungsmethoden.

SUMARIO

O autor discute as lesões do nervo facial do ponto salientando particualmente a importância da localização acurada da lesão. A êste respeito, descreve as manifestações das lesões do neurônio motor superior, as numerosas vias nervosas que poem em comunicação as várias estruturas nervosas com o nervo facial, eas características da lesão do neurônio motor superior, com critérios para seu diagnóstico. As lesões do neurônio motor inferior são tratadas da mesma maneira. É incluido um esquema para a diferenciação das lesões do neurônio motor superior das do inferior e são descritos vários testes de utilidade.

Author's Note: Pertinent bibliographic data and appropriate illustrations are presented in the author's article *Eight Syndromes of Facial Paralysis and Their Significance in Locating the Lesion,* Ann. Otol. Rhinol. & Laryngol. 62:677 (Sept.) 1953.

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Education is either from nature, from man or from things. The developing of our faculties and organs is the education of nature; that of man is the application we learn to make of this very developing; and that of things is the experience we acquire in regard to the different objects by which we are affected. All that we have not at our birth, and that we stand in need of at the years of maturity, is the gift of education.

—*Rousseau*

Surgical Repair of the Facial Nerve

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LOSS of function of the seventh cranial nerve is characterized by loss of facial expression and difficulty of mastication, speech, and closure of the eye on the affected side. Many psychic, economic and social hazards are coincident with this deformity.

A large number of injuries and insults to the facial nerve are caused by disease. Trauma, however, is the predominant cause of such deformities today, because of the pace of modern civilization and the results of war, traffic accidents and mechanized industry. Injuries to the facial nerve occurring as an aftermath of surgical treatment have been considerably reduced in incidence, owing in great part to improved surgical skill and the use of antibiotics and chemotherapy.

It is my purpose here to emphasize my opinion, based on observation, that the best therapeutic results in cases of facial paralysis are not obtained by waiting to see what happens, whether or not the nerve regenerates, and so forth. Atrophy of the facial muscles, stretching of the skin and psychic trauma have been observed, which undoubtedly could have been prevented if early operative intervention had been undertaken, instead of a waiting period of one year or more. I have seen patients who were definitely helped to recovery by early operation.

Excepted, of course, are acute Bell's palsy and other such conditions from which an early recovery is anticipated. According to Howell,[1] muscles atrophy when not used, and if a motor nerve is cut so that the muscle is completely paralyzed a true degenerative atrophy ensues, resulting finally in disappearance of muscular tissue. So-called simple muscle atrophy, however, may occur as a result of mere disuse. Two factors, circulation and tonus, are necessary for the development and maintenance of muscle. Circulation is dependent upon exercise to augment the blood flow for nutrition, and changes in tonus are essential to maintain a normal nutritive condition.

Létiévant[2] in 1873 advocated repair of nerve defects by means of nerve grafts. Since then, muscle transplantation, fascia lata slings, fascia transplants, nerve anastomoses and inert materials have been variously employed. Results of experimental and clinical investigation have aroused great interest and produced a challenge to perfect a satisfactory procedure or procedures to correct anomalies of the seventh nerve.

Interest in correction and care of this condition was stimulated during World War II and the Korean conflict, as injuries resulting in facial paralysis were encountered in large numbers of "casualties." Operative repair ran the gamut of the various methods devised for this correction. Since then, during the continued search for an acceptable method of correction, the best results have been obtained by a combination of procedures applicable to the individual patient.

Anatomic Background.—Anatomically, the facial nerve has both a motor and a

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Oct. 20, 1954.

sensory root known as the nerve of Wrisberg. The motor root arises in the facial nucleus in the lower part of the pons. After transversing the cerebello pontine cistern in close contact with its sensory root and the acousticus, it enters the internal auditory meatus. Through a foramen in the inferior surface of the internal auditory meatus, the motor and sensory roots enter the facial canal. The motor root traverses the geniculate or sensory ganglion and is joined by the sensory fibers. At this point connection is made with the sphenopalatine ganglion through the great superficial petrosal nerve.

The facial nerve emerges at the stylomastoid foramen. It first lies under the attachment of the posterior belly of the digastric muscle, then courses forward above this muscle and enters the lower part of the parotid gland, through which it passes for about 2 cm., subsequently lying on the surface of the facial muscles. It divides into numerous branches supplying all the muscles of the face and the platysma myoides. The sensory portion beyond the geniculate ganglion lies for a short distance within the facial nerve proper. It then emerges in the vertical position of the fallopian canal at the chorda tympani nerve, which joins the lingual nerve and carries the sense of taste from the anterior third of the tongue. Deep pressure sense over the entire face is also carried by the seventh nerve, although the course of the fibers carrying the sensation is not definitely known. The facial nerve anastomoses with the second division of the trigeminal division, through branches from the chorda tympani to the otic ganglion, with the glossopharyngeal through the facial anastomosing ramus to the tympanic nerve. The tympanic nerve has its origin in the petrosal ganglion and passes to the otic ganglion by way of the lesser superficial petrosal nerve.

Etiologic Factors.—Paralysis of the facial nerve has its origin at different levels and may be divided into supranuclear, nuclear and peripheral. Supranuclear paralysis usually is caused by a lesion with a cortical facial center, frequently a tumor in the frontal, temporosphenoidal or anterior parietal region, which presses upon or actually destroys the center. Brain abscesses that occur in the temporosphenoidal lobe, middle meningeal hemorrhage caused by trauma, and cerebral hemorrhage often produce facial weakness of a central type.

Nuclear paralysis may be caused by poliomyelitis, syphilis, diphtheria or pontine tumor.

Peripheral facial paralysis is caused by a lesion external to the nucleus. Bell's palsy is the most frequent type, and is caused by inflammation or edema of the nerve within the fallopian canal. Other lesions within the canal producing paralysis are: fractures extending through the petrous portion of the temporal bone; bullet wounds; crushing or cutting of the nerve during operation; traction on the great superficial petrosal nerve, or pressure on the geniculate ganglion; otitis media, and herpes zoster. After its exit from the stylomastoid foramen, the trunk of the facial nerve is frequently injured by stab or bullet wounds; by incision for the drainage of abscesses; by removal of parotid tumors, and by forceps delivery.

Symptoms. — The symptoms of facial paralysis are likewise dependent upon the location. Supranuclear paralysis is characterized by inability to retract the angle of the mouth or move the lower groups of facial muscles on the side opposite the lesion, while ability to close the eye and wrinkle the forehead is retained.

Nuclear lesions, as well as those along the peripheral portion of the nerve, result in paralysis of all the facial muscles. If the facial nerve is injured in its intracranial portion without injury t intermedia, the sensation of taste remains unimpaired. A lesion of the nerve within the fallopian canal, between the geniculate ganglion and the point of the facial nerve at which the chorda tympani emerges, causes combined unilateral facial paralysis and unilateral loss of taste on the anterior two-thirds of the tongue. An injury peripheral to the emergence of the chorda tympani results in simple muscular paralysis; both voluntary and involuntary motion are lost, and the muscles lose their tone. In the presence of incomplete lesions, muscle tone may be preserved, but muscular contractions are impossible.

Treatment. — Surgical intervention is indicated for all operable patients in whom it is evident that the facial nerve has been completely divided. With all other patients, however, sufficient time should be allowed for spontaneous regeneration. Some recovery should be noted within six months if regeneration is physically possible. Surgical intervention should be undertaken within a year, since the percentage of postoperative recoveries is much greater during the first twelve months than it is thereafter. Rapid improvement has been noted in a number of patients after support of the relaxed muscles, although no previous evidence of returning function had been noted.

The prognosis of extracranial lesions depends on the cause and the time of treatment. Idiopathic lesions that occur without definite cause resolve spontaneously in 80 to 85 per cent of patients within four to six weeks; some as late as three to five months. Tumarkin[3] observed that, if pain is absent and no impairment of taste sensation exists, the chances of recovery are 25 to 1.

There is a divergence of opinion as to the reliability of nerve and muscle response to faradic and galvanic stimulation from a diagnostic and prognostic standpoint. Recently, the use of electrodiagnosis and electromyographic study have been increasingly advocated by some authors for this purpose. Erb[4] made the following observations: 1. If there is no change on faradic or galvanic stimulation, the lesion is slight; recovery may be expected in fourteen to twenty days. 2. If faradic and galvanic excitability of the nerves is only lessened, and that of the muscles increased to the galvanic current, and the contraction formula AC is greater than KC, recovery will take place in four to six weeks. 3. When the reaction of degeneration is present and the mechanical excitability is altered, the prognosis is relatively unfavorable.

If the nerve has been severed, recovery is unlikely without surgical restoration of continuity. If the nerve is merely contused or partially severed, however, as in a case of incomplete paralysis, the chances of spontaneous recovery are good. If there is compression of the nerve within the facial canal because of inflammatory or suppurative exudates, the outcome is usually satisfactory provided an immediate decompression is carried out.

1. *Conservative Treatment*: Unless the paralysis is the result of a definite lesion, such as severance of the nerve or compression, a reasonable time for spontaneous recovery should be permitted before surgical intervention is undertaken. During this period, measures must be taken to prevent overstretching of the affected muscles and also to prevent shortening of their antagonists on the other side. Electrical treatments for maintenance of muscle tone are probably of little value, since they cannot be expected to activate muscles already paralyzed, and, in the case of those muscles in which recovery has begun, active motion will do more to hasten the process than will electrical stimulation. When the paralysis has existed for six months without material improvement, surgical intervention is indicated. Should

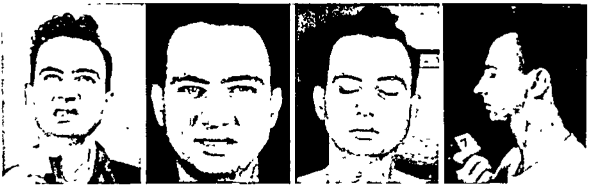

Fig. 1.—Paralysis of the seventh nerve due to high explosive, corrected by nerve anastomosis and fascial sling.

there be evidence of regeneration, the operation may be deferred for another six months. After this period the chance of recovery is lessened in proportion to the length of the postponement. Stracher[5] reported 66 per cent of recoveries when operation was performed four to six months after injury and only 24 per cent when it was performed seven to twenty-two months after injury.

2. *Surgical Treatment*: The primary purpose of surgical treatment of the facial nerve is physiologic restoration of function. Patients may be divided into two clinical groups: the recent patients, in whose cases hope is held for nerve suture, nerve graft or nerve anastomosis; and patients in whom nerve regeneration by any procedure is passed, namely, elderly people, in whom muscular relaxation is great. In children and young adults, relaxation may not be extremely marked. In elderly patients the paralytic ectropion is a source of worry.

Surgical procedures for alleviation of the symptoms of paralysis of the seventh nerve paralysis are of three types: (a) those which attempt to reanimate the facial muscles, comprising decompression of the nerve and direct end-to-end anastomosis with the continguous motor nerves; (b) those which attempt to conceal or minimize the deformity by fascial or muscular suspension and/or face lifting on the affected side, and (c) a method combining two or more of these procedures (Fig. 3).

The attempt to restore conduction to a paralyzed nerve by means of an adjacent healthy nerve is not new. Animal experimentation by Létiévant first revealed the possibility of such an operation. In 1895 Ballance and his associates[6] made the first experiments in anastomosis between the hypoglossal nerve and paralyzed facial nerve. In 1898 Faure and Foret[7] were able to establish an anastomosis between the accessory and the facial nerve.

Koerte and Bernhardt[8] in 1902, after they found that they had divided the facial nerve during an operation on the petrosal bone, established an anastomosis between the hypoglossal nerve and the peripheral trunk of the facial nerve. Also in 1902, Sick and Saenger[9] effected an anastomosis between the peripheral trunk of the facial nerve and the accessory nerve. Thereafter, reports of such cases increased, in spite of the fact that the end results were far from satisfactory. Anastomoses have been performed since then and are still used.

From personal observation and a critical survey of results, I have found that not infrequently the muscular tone was restored several months after operation, so that a good cosmetic effect was obtained in the resting state. These results were less satisfactory, however, in the voluntary movements of t [illegible] les.

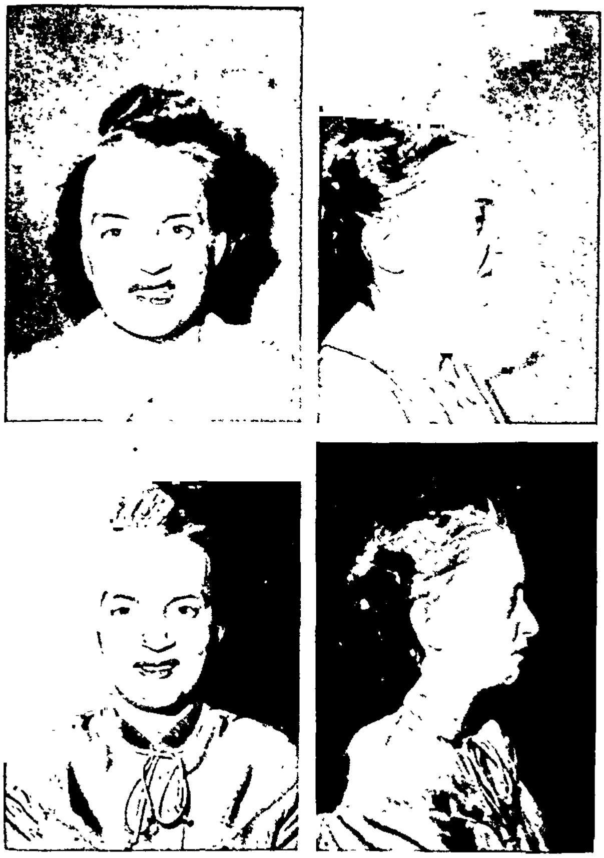

Fig. 2. — Long-standing paralysis of seventh nerve restored with face lift and fascia lata sling.

no patient were the mimic involuntary movements expressing change of mood restored to such an extent as to appear symmetric.

It was also noted that disturbing associated movements of the muscle innervated by the donor nerve, which had been completely divided, produced transitory and often permanent unpleasant and unsightly atrophy of the involved muscle. It seems clear that complete success is not to be hoped for from nerve grafting operations. It has been repeatedly emphasized that the good cosmetic effect might be achieved by simpler plastic operations on the muscles or the fascia.

Recently the hypoglossal nerve has been the one chiefly used, while use of the accessory nerve, which involves more serious late sequelae, has been relegated more to the background. Lately the glossopharyngeal nerve has been used; it was suggested for this purpose long ago. Leriche[10] suggested resection of the cervical sympathetic ganglion for relief of facial paralysis and obtained successful results with this method in several patients. This is explained by the fact that Horner's syndrome results and permits closing of the eye. Direct suture of the facial nerve has been successfully performed in numerous instances. Bunnell[11] recommended rerouting the nerve provided the interval between the nerve ends does not exceed 16 mm. beyond the genu or 23 mm. at the geniculate ganglion.

Ballance and Duel[12] advised immediate decompression for the idiopathic types of paralysis of the seventh nerve. However, 80 to 85 per cent of patients with these conditions recover spontaneously, leaving only 15 to 20 per cent for whom operative intervention is indicated. Application of this principle can result in a great many unnecessary operative procedures.

Mechanical suspension of the paralyzed muscles by insertion of subcutaneous loops of fascia lata, though unable to restore voluntary or emotional control, serves to relieve the distortion of overcoming the pull of the unaffected muscles. Defects of the nerve considered irremediable are definite indications for suspension. Fascia transplants are valuable adjuncts to nerve grafting and anastomosis, since fascia lata strips act as splints and prevent overstretching of the muscles while the nerve is undergoing regeneration. Fascial suspension is preferable to nerve anastomosis, which improves the deformity only in repose, leaving the patient with distressing associated muscular movements.

Material for a mechanical suspension has run the gamut of aluminum, bronze wire, silk, *et cetera*. Stein[13] was the first to use fascia lata for a paralyzed seventh nerve. Blair,[14] however, standardized and popularized the method. Gillies,[15] the first to reinstate the use of muscles in cases of facial paralysis, attached the fascial strands to the temporal muscle, in the hope that some simulation of facial expression would occur.

Technic of Fascial Suspension.—Since Blair, Ballance, Duel, Bunnell and others pioneered in facial surgery and mechanical suspension for paralysis of the seventh nerve, there have been few dramatic changes in the procedures they developed and standardized.

The following procedure is employed by myself: Fascia is procured by a technic described by Masson.[16] The fascia strips employed are approximately 5 mm. wide and as long as it is possible to take; or, if desired, a wide strip may be removed and split along the grain to the desired width. Strips will need to be spliced, since the length of fascia will not be sufficient for the lower part of the face. If the strips are too wide, danger of sloughing will become evident, especially if an insult has occurred to the vascular supply; for example, after irradiation.

Stab wounds are made in the forehead, above the inner and the outer canthus, approximately halfway between the hairline and the supraorbital ridge, and another stab wound is made below the inner and the outer canthus of the affected side. A strip of fascia is introduced into the stab wound above the outer canthus by means of a Blair fascia needle and is carried down and out of the stab wound below the outer canthus. The fascia is again attached to the needle, carried across to the inner canthus and then carried upward to the medial stab wound above the inner canthus. One end of the fascia is then fixed to the epicranius muscle with fine silk sutures. The other end is brought out of the stab wound and drawn to the desired tension, bringing the lower eyelid up to the pupil of the eye and to meet the upper eyelid. This end is then made fast to the epicranius muscle and fascia.

The cheek will of necessity vary with the atrophy and relaxation of skin and muscles, the age of the patient and the length of time for which the lesion has been present. For the relaxed, long-standing patient, the incision to expose the temporal fascia, temporal muscle, and parotid fascia begins near the apex of the skull, down to the upper attachment of the ear, down in the crease of the ear, to inside the tragus of the ear; down and out of the ear, the lobule being cut loose and the incision carried up behind the ear to the highest point of the mastoid; then posteriorly, for approximately 2 inches (5 cm.): then downward for about 1½ inches (3.7 cm.), and upward at an angle of about 60 degrees to meet the horizontal incision behind the ear. The scalp and face are then undermined forward so as to expose the periosteum of the skull, the fascia of the temporal muscle and the fascia covering the parotid gland and neck. The fascia strips are then introduced by way of a Blair fascia needle, beginning in the incision exposing the temporal and parotid fascia. The fascia is inserted subcutaneously and intramuscularly and is brought out through a stab wound lateral to the alae. An empty needle is then inserted and brought out to grasp the loose end of the fascia through a different channel, and the two ends are grasped with a forceps, to remain until this procedure is carried out to the upper lip, the angle of the mouth and the lower lip. The upper and lower lips are grasped with a Jacobs forceps for fixation and for help in tying the fascia. The fascia loop is carried across the midline in the upper and lower lip, close to the vermillion border, for a distance of approximately 1 cm. Then one end of each loop is carried into the temporal muscle and through the fascia, an each is

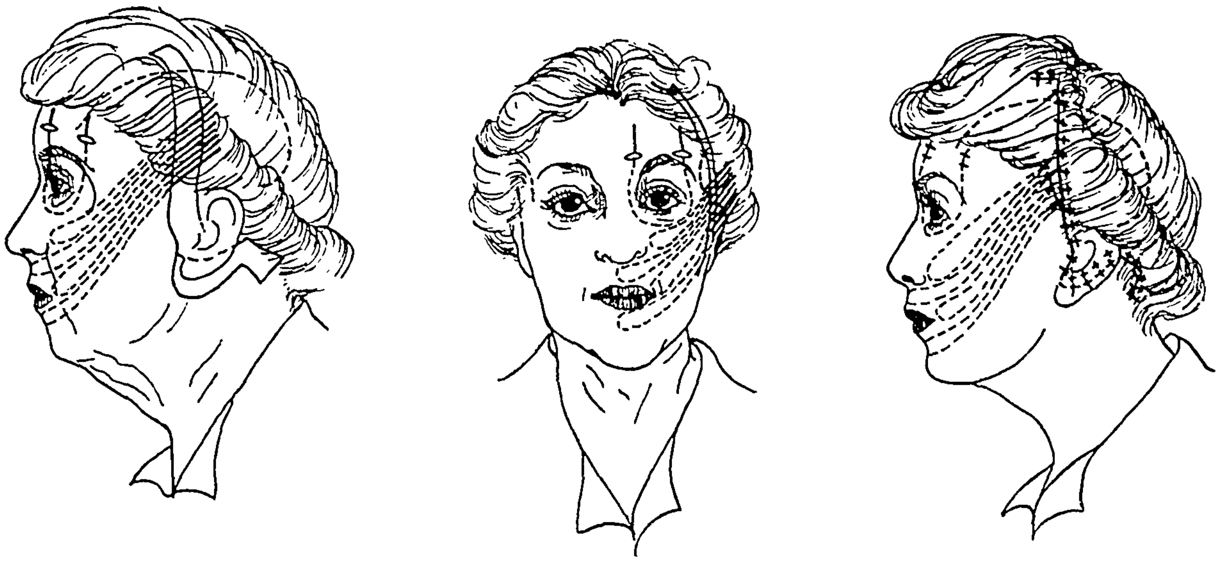

Fig. 3.—Technic used by author for fascial sling, and combined with face lift.

brought out and tied to its fellow. The knot is then reinforced with silk sutures. This procedure is carried out until all loops are tied in the temporal muscle and fascia. The excess skin is then excised and sutured as for a face lifting. The face is dressed by supporting the cheek with strips of adhesive tape on the outside of the cheek, and pressure dressing, which is not disturbed for one week. At the end of a week the stitches are removed and the adhesive support reapplied for one to two weeks longer.

COMMENT

Management of patients with fascial paralysis requires an accurate diagnosis and a knowledge of the anatomic aspects of the seventh nerve. The cause and seriousness of the injury to the facial nerve, as well as information concerning the duration of the paralysis, may have a marked bearing on the choice of a corrective procedure and the time of operation. For this reason, the importance of careful history taking in these cases, when possible, should be stressed.

Also, persons with deformities resulting from injury to the facial nerve need the assurance that partial, if not complete, restoration of function and cosmetic appearance will be forthcoming. The role of the surgeon in those cases in which only partial restoration is anticipated requires patience, understanding and help in their eventual rehabilitation.

It is the consensus that nerve suture for facial paralysis is feasible only when the facial nerve is cleanly severed; for example, during aseptic operations and when immediate or early repair can be attempted. After a few weeks, or even days, there is often so much tissue intervening between the nerve stumps, retraction of the severed nerve ends and fibrosis of the stumps of the nerve that location and union of the distal end is difficult. In these instances, rerouting of the nerve is recommended as a more favorable procedure.

I have found the aforedescribed technic of fascial suspension as a method that furnishes satisfactory cosmetic and functional results, alone or in combination with the other procedures previously described. I do not employ muscle suspension, for the reason that muscle is a contractile and not a supporting tissue. Its use results in stretching and atrophy from loss of nerve fibers and weight of the face. Fascia, being a supporting structure, maintains its original tension and support.

Likewise, I do not advocate skin excision, except in the face lifting procedure with fascia, as the face, because of the further relaxation of the skin and facial tissues, will revert in time to the anomalous condition for which the operation was originally performed.

The use of contiguous nerves and nerve grafting results in deformities that are unpleasant to the patient.

Nerve anastomosis, as has been stated, is a valuable procedure for obtaining function of the paralyzed facial nerve. For obvious reasons, however, choice of this method of repair is extremely selective in the presence of infection, e. g., in a case of mastoidectomy, which precludes immediate suture.

SUMMARY

The etiologic background, symptoms and surgical treatment of paralysis of the seventh cranial nerve are discussed.

Evaluation is made of various technics and procedures, previously and currently employed for surgical repair of seventh nerve injuries, and their anomalous sequelae.

A technic of fascial suspension for adequate support of the paralyzed facial muscles is described, which, in the author's hands, has proved successful.

Early surgical intervention when spontaneous recovery is not possible is emphasized as definitely helpful in obtaining physiologic restoration of function of the facial nerve and muscles. Attention is directed to untoward effects resulting from long delayed surgical intervention.

ZUSAMMENFASSUNG

Aetiologie, Symptomatologie und chirurgische Behandlung der Fazialislähmung werden erörtert.

Der Wert verschiedener augenblicklich und früher angewandter Verfahren zur chirurgischen Wiederherstellung von Fazialisverletzungen und ihrer krankhaften Folgezustände wird untersucht.

Es folgt eine Beschreibung der Technik einer Faszienaufhängung zur Unterstützung der gelähmten Gesichtsmuskeln; das Verfahren hat sich dem Verfasser als erfolgreich erwiesen.

Es wird hervorgehoben, dass beim Ausbleiben einer Spontanheilung die frühzeitige chirurgische Behandlung von unbestreitbarem Wert zur Wiederherstellung der physiologischen Funktion des Fazialisnerven und der Gesichtsmuskeln ist. Auf die unangenehmen Folge zustände, die sich aus einer langen Verzögerung des chirurgischen Eingriffs ergeben, wird hingewiesen.

RESUMEN

Se discuten la etiología, síntomas y tratamiento quirúrgico de la parálisis del séptimo nervio craneal.

Se hace una apreciación de diversas técnicas, empleadas comunmente para la reconstrucción quirúrgica de las lesiones de dicho nervio y sus secuelas consiguientes.

Se describe una técnica de suspensión facial para sostener los músculos faciales paralizados, que en la opinión del autor ha tenido éxito.

Se señala la intervención quirúrgica precoz cuando no existe recuperación espontánea, como la ayuda definida para obtener restauración fisiológica de la función del nervio y músculos faciales. Se dirige la atención hacia los efectos perjudiciales resultantes de las intervenciones quirúrgicas tardías.

RIASSUNTO

Studio sulla etiologia, sintomatologia e terapia chirurgica delle paralisi del setti-

mo nervo cranico. Viene fatta una valutazione delle varie tecniche usate nella terapia chirurgica delle lesioni in oggetto e dei loro postumi, con particolare reguardo ad una tecnica che, nelle mani dell'autore, si è dimostrata molto giovevole. L'autore raccomanda di operare precocemente quelle lesioni che mostrano di non regredire spontaneamente, se si vuole ottenere una restitutio ad integrum della funzione dei muscoli e del nervo facciale; mentre, per contro, richiama l'attenzione sugli effetti deleterii risultanti dagli interventi chirurgici tardivi.

RÉSUMÉ

L'auteur discute l'étiologie, la symptomatologie et le traitement chirurgical des affections du 7e nerfs cranien.

Il passe en revue les différentes techniques chirurgicales utilisées jusqu'à ce jour et leurs séquelles exceptionnelles.

Il décrit une technique de suspension des muscles faciaux paralysés avec laquelle il a obtenus de bons résultats.

Il souligne l'importance du traitement chirurgical précoce dans les cas o la guérison ne peut être obtenue, qui permet une récupération fonctionnelle physiologique du nerf et des muscles faciaux. Il attire l'attention sur les suites fâcheuses que peut entraîner le retard de l'opération.

SUMARIO

São discutidos os fundamentos etiológicos, os sintomas e o tratamento cirúrgico da paralisia do 7° nervo craniano.

É feita uma avaliação de várias técnicas e processos empregados anteriormente, bem como atualmente, para o tratamento cirúrgico das lesões do 7° nervo e suas sequelas.

É descrita uma técnica de suspensão fascial para dar apôio adequado aos músculos faciais paralisados, a qual tem dado bons resultados nas mãos do autor.

A intervenção cirúrgica precoce, quando o restabelecimento espontâneo não é possível, tem um valor definido para se obter restauração fisiológica da função do nervo e músculos faciais.

É chamada a atenção para os resultados desfavoráveis resultantes do atrazo da intervenção cirúrgica.

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Whatever be the detail with which you cram your student, the chance of his meeting in afterlife exactly that detail is almost infinitesimal; and if he does meet it, he will probably have forgotten what you taught him about it. The really useful training yields a comprehension of a few general principles with a thorough grounding in the way they apply to a variety of concrete details. In subsequent practice the men will have forgotten your particular details; but they will remember by an unconscious common sense how to apply principles to immediate circumstances. Your learning is useless to you till you have lost your textbooks, burnt your lecture notes, and forgotten the minutiae which you learned by heart for the examination. What, in the way of detail, you continually require will stick in your memory as obvious facts like the sun and the moon; and what you casually require can be looked up in any work of reference. The function of a University is to enable you to shed details in favor of principles. When I speak of principles I am hardly even thinking of verbal formulations. A principle which has thoroughly soaked into you is rather a mental habit than a formal statement. It becomes the way the mind reacts to the appropriate stimulus in the form of illustrative circumstances. Nobody goes about with his knowledge clearly and consciously before him. Mental cultivation is nothing else than the satisfactory way in which the mind will function when it is poked up into activity.

—*Whitehead*

Editorial

Anesthetic Explosions

A RECENT tragic anesthetic explosion in the operating room of a Wisconsin hospital focuses attention on the great danger to which patients and operating personnel may be exposed. The Wisconsin explosion killed the patient and injured some of the personnel.

It has been estimated that gas anesthetics are administered ten million times every year in the United States, and that only 80 to 100 explosions are reported annually. This is admittedly a rather low incidence. Twice that number may occur, since it is possible that only those involving fatalities or injuries are reported. Explosions in the operating room are not easily explained to the public, and the hospital naturally does not desire publicity in such matters.

Be that as it may, the fact remains that if such an accident happened in your operating room or mine, it would be a tragedy. What can be done about this danger?

After a serious explosion in a Boston hospital in 1938, a careful study of the subject was made by Dr. Frank Lahey and his associates. At Dr. Lahey's request, the Massachusetts Institute of Technology appointed a committee of scientists to study the problem, and the anesthetists made it the subject of much discussion on their programs.

Both the Boston and the Wisconsin explosions occurred after the use of cyclopropane, although in the latter instance cyclopropane had been stopped and ether substituted. The remarkable point about the Wisconsin explosion is that it occurred in a newly built operating room, where every known safety device had been employed in the construction. The anesthetic was administered by a highly competent anesthetist, an M.D.; the operation had not yet begun. The only discoverable cause was the possibility of an electrostatic charge brought into the room by an orderly, who had taken the normal precautions for discharging his body before he approached the operating room.

My interest in this subject was aroused thirty-four years ago, when I chanced to be present when one such explosion occurred. A radical mastectomy was being performed. A student nurse came into the room with a red-hot cautery, and in something less than seconds the ether exploded and the room blew up. Almost everything movable, including myself, was blown across it. Fortunately, no one was injured; but I did then and there acquire a high respect for the explosive potentialities of inhalation anesthetics.

In 1928 I abandoned inhalation anesthesia in 95 per cent of my cases, using spinal anesthesia and superficial nerve block instead and thus eliminating the explosion hazard in all but 5 per cent. Yet one explosion in that 5 per cent would mean disaster, so my interest in the problem has never slackened.

It was given fresh impetus about a year ago, when I visited several hospitals in New York City as a member of the Wisconsin Surgical Travel Club. To our surise, we were required to shed our clothes, t on surgical suits and wear special ockproof footgear before entering the erating room. Immediately thereafter ɔegan to study the subject and to obtain ıterial from the heads of the departɜnts of anesthesiology in several large stitutions.[1]

Before writing to these anesthesiolosts, however, I learned that cyclopropne was being used in our own hospital, d a check of the operating rooms realed possible sources of electrostatic plosions. Advised by our anesthetists at ether carried as great a hazard as did clopropane, I disagreed, and directed at no cyclopropane be used until a orough investigation could be made by . expert. I was referred to an article by :. Collins[2] in which he stated, "Five her anesthetics are equally as hazardıs" (as cyclopropane). A letter from :. Collins confirmed this statement, addg, "The incidence of explosions in a simır number of anesthetic administrations nearly the same with either cyclopro.ne or ether."

Dr. Eversole said that "almost every halation anesthetic agent, with the exption of unsupplemented nitrous oxide, explosive, and many explosions have ɜen reported from the use of ether and :ygen and even with open deep ether. ı the other hand . . . the coefficient of :pansion of cyclopropane and oxygen is ch that an explosion with this agent may more violent than that with some of e others." He emphasized the use of the orton intercoupler as an additional safeguard, and referred me to an excellent article on the subject.[3]

Dr. Lundy also wrote a very instructive letter, expressing the hope that in the not too distant future the inhalation anesthetics would be available in a nonflammable form. He pointed out that if the Horton intercoupler is used it should be tested frequently, probably at least twice a year, for broken wires. He also referred me to an article, "Fire and Explosion Hazards in Hospitals,"[4] suggested Dr. John Gilroy[5] as the expert who should survey the situation at our hospital.

In Dr. Gilroy's judgment, our operating rooms presented some good features, e.g., the fact that all electric switches have been elevated five feet above the floor, and some not so good, including the type of flooring. (I wonder how many operating room floors are of the ideal type, i.e., of conductive rubber?) At a special staff meeting devoted to this subject, Dr. Gilroy will return to discuss his observations and give us his recommendations for reducing our explosion hazards.

Dr. Hale wrote that at present they do not use cyclopropane at the Cleveland Clinic, but plan to do so as soon as they can obtain conductive flooring.[6] "Although often done," he said, "it is not logical to forbid the use of cyclopropane while permitting the use of ether. Both are explosives in the ranges used for anesthesia, and ether has a lower ignition temperature than cyclopropane. In order to make the use of these gases as safe as possible, the following should be observed:

"1. All electric outlets should be about five feet above the floor and should provide a ground.

---

[1] Among those who furnished me with highly structive information were Drs. John Lundy of e Mayo Clinic; Urban Eversole of the Lahey inic; D. E. Hale of the Cleveland Clinic; Vinnt J. Collins of St. Vincent's Hospital, New ɔrk, and George J. Thomas of St. Francis' Hostal, Pittsburgh.

[2] Hospital Topics, November 1954.

[3] Orr, Robert R.: Explosion Hazards, S. Clin. ɔrth America 30:30, June 1950. (Another inructive pamphlet was published by the National .re Protection Association in 1949.)

[4] *Journal-Lancet, October 1954.*

[5] Dr. Gilroy is connected with the Ohio Chemical and Surgical Equipment Company of Madison, which has published two other informative articles, "What *Do* You *Know About Conductive* Rubber?" and "Safety in the Operating Room."

[6] A quick estimate of the co such flo for our operating rooms was

"2. All electrical equipment should be properly grounded, and no extension cords should be used.

"3. Flame, actual cautery, a high frequency scalpel and coagulating apparatus should not be used.

"4. Nylon outer garments and wool blankets should not be permitted in the operating room.

"5. All personnel should wear conductive shoes.

"6. In the absence of a satisfactorily conductive floor the patient should be grounded to the operating table . . . the table to the floor and the anesthetist's stool . . . the sole of the anesthetist's foot and the gas machine to the floor."

Dr. Hale referred me to a booklet entitled "Recommended Safe Practice for the Hospital Operating Room"[7] and to Dr. Thomas[1] as a nationally recognized authority. Dr. Thomas wrote to me as follows: "Ether-oxygen and nitrous oxide-oxygen-ether mixtures are just as flammable and sensitive to ignition as cyclopropane-oxygen and ethylene-oxygen mixtures. Helium will assist in the prevention of ignition of cyclopropane-oxygen with static electricity." He also sent me an instructive pamphlet, "Fire and Explosion Hazards in Anesthetizing Areas."

What are the conclusions to be drawn? Three months ago I knew almost nothing about this subject. Using inhalation anesthetics in only five per cent of my own major surgical procedures, I had not felt the need to know. As the head of our Clinic and the one responsible for its successful operation, I realized that it was my duty to learn all I could about anesthetic explosions. Yet, even now, after reading many articles on the subject, I realize how little I still know and how much there is to be learned.

It is discouraging to discover that even in an operating room with every available protection a tragic explosion may still occur. What are the chances of its occurrence in the average, poorly protected room? Every surgeon who reads this should investigate, without delay, the hazards of his own operating room or those of the hospitals where he operates. It is obviously impossible to eliminate all hazards, but it could be both interesting and rewarding to check the list of precautions suggested by Dr. Hale.

Unexpected and highly pertinent facts may be revealed. For example, Green, in 1941, found that 57 of 230 fires and explosions involving anesthetic agents were caused by an open flame or a hot body acting as the source of ignition. One must also consider the human element, e.g., the young, inexperienced training-school nurse.

What about your portable electrical equipment? Is the endoscopic equipment regularly checked? Sometimes these accidents may be caused by accidental short circuiting of exposed terminals; unsuspected failure of insulation; faulty contacts in the scope; switches; rheostats, or accidental exposure of a hot filament by the breaking of a bulb.[3] All endoscopic equipment must be frequently checked and kept in proper condition if these accidents are to be avoided. All electrical equipment should conform to the National Electric Code and should be inspected periodically by a qualified electrician.

In addition, before any electrical apparatus is connected, or turned on during an operation, the permission of the anesthetist should be obtained.[3] An electric spark is responsible for the explosion in the majority of cases. No electrostatic charge can be built up without the presence of some insulating material. If all material present is conductive, any electrostatic charge that might otherwise be built up will be immediately equalized. Any insulating material present will act as a barrier to the flow of electricity and as a generator of electrostatic discharge. According to Dr. Orr,[3] the ideal would be to have all objects in the operating room interconnected by conductors, so that any electrical potential built up will be immediately equalized and no spark discharge can occur.

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[7] National Fire Protection Association, 60 Batterymarch Street, Boston. 25c.

The experimental study conducted by Woodbridge, Horton and Connell after the Lahey Clinic explosion in 1938 revealed that even maintaining a relative humidity of 55 to 60 per cent is not *per se* an adequate protection against electrostatic sparks. They further found that an anesthetist wearing cotton garments acquires a potential of several hundred volts merely by sliding forward on a cushioned stool and then rising. The potential is much greater when woolen garments are worn.

Apparently most explosions occur within a radius of two feet from any gas leak. Leaks occur predominantly at the escape valve between the mask and the patient's face, from the breathing tubes and from the patient's respiratory tract after removal of the mask. The four bodies located in the so-called danger zone[3] are the anesthetist, the anesthesia machine, the patient and the operating table. If these objects are all intercoupled, sparks are not likely to be discharged between them, and the chief hazard thus becomes a limited one. The Horton intercoupler was developed to meet this need.

The rebreathing bag should not be removed during anesthesia; rubber parts should be conductive, and visitors should not be allowed in the danger zone. Clothing and shoes particularly are hazardous factors.

Our young associates are frequently advised that the way to learn a thing is to write a paper on it, and I have found this true of myself. Considering the many potential sources of danger, it is remarkable that operating room explosions do not occur in far greater numbers and with more disastrous results. It is imperative for all of us to interest ourselves in this subject today, not after an irreparable tragedy has taken place.

—ARNOLD S. JACKSON
M.D., F.A.C.S., F.I.C.S.

* * *

Democracy is based upon the conviction that there are extraordinary possibilities in ordinary people.

—*Fosdick*

Democracy has not failed; the intelligence of the race has failed before the problems the race has raised.

—*Hutchins*

The only way in which to fit a people for self-government is to entrust them with self-government.

—*Macaulay*

New Books

Books Received.—The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

Legal Medicine, Pathology and Toxicology. By Thomas A. Gonzales, Morgan Vance, Milton Helpern, and Charles J. Umberger. 2nd ed. New York, Appleton-Century-Crofts, Inc., 1954. Pp. 1349. Profusely illustrated.

Les Vomissements du Nourisson: Etude critique, Diagnostic étiologique, Indications thérapeutiques. Par Emilio Roviralta. Edition revue et augmentée par l'auteur en 1952. Adaptation française de Bernard Duhamel, d'après la traduction de Edouard Del Castillo Japuolot. Paris, Éditions Médicales Flammarion, 1952. Pp. 236. Illus.

Technique de la Chirurgie du Sympathique et de ses Infiltrations. Par O. Lambret, P. Razemon, et P. Decoulx. 4e éd. Paris, G. Doin & Cie., 1953. 115 figures et 4 planches.

Cystites Invétérées et Algies Pelviennes, leur Traitement par Infiltrations Anesthésiques et Neurotomies Chirurgicales. Par Raymond Darget et Rolland Ballanger. Paris, Masson & Cie., 1954. Pp. 118. Illus.

El Dranaje en Cirugía. Por Domingo Prat. Montevideo, Imprenta Rosgal, 1954. Pp. 166. Illus.

Aspectos Quirurgicos de la Estasis Biliar. Por J. Pi-Figueras, con V. Artigas y A. Llauradó. Madrid, Asociación Española de Cirujanos, n.d. Pp. 155. Illus. (III Congreso Nacional de Cirugía, Granada, Septiembre de 1953).

La Aortografía Abdominal. Por Ramon Carillo, Raul F. Matera, y Juan de Dulácska. Buenos Aires, Lopez & Etchogoyen, S.R.L., 1954. Pp. 114. Illus.

Sindromi Dolorose dopo Interventi Gastrici e loro Terapia Chirurgica. Per Luigi Leopoldo Bracco. Torino, Minerva Medica, 1952. Pp. 178. Plates.

Thorakoskopische Eingriffe am Nervensystem. Von E. Kux. Stuttgart, Georg Thieme, 1954. Pp. 130. 48 Teils mehrfarbigen Abbildungen.

Pratique de L'intubation intra-trachéal en Anesthésie. Par Henri Gibert. Paris, G Doin & Cie., 1953. Pp. 188. 39 figures.

Pheochromocytoma and the General Prac titioner. By Joseph L. DeCourcy and Cor nelius B. DeCourcy. Cincinnati, DeCourc Clinic, 1952. Pp. 165.

The Year Book of Obstetrics and Gynecol ogy, 1954-1955. Ed. by J. P. Greenhill. Chi cago, Year Book Publishers, 1954. Pp. 544 Abstracts.

Anuario Bibliografico Peruano de 1949 1950. Ed. by Alberto Tauro. Lima, Bibliotec Nacional, 1954. Pp. 427. (Ediciones de la Biblioteca Nacional-IX.)

A general bibliography. I. Books and pam phlets. II. Periodicals. III. Bio-bibliogra phies. IV. Bib. of librarianship. Fully in dexed, with cumulative contents of th series.

Part I contains a section on medica sciences.

Hugh Roy Cullen, a story of America Opportunity. By Ed Kilman and Theo Wright. New York, Prentice-Hall, 1954. Pp 376. Illus. Biography of a distinguishe medical benefactor.

Diseases of the Skin, for Practitioners an Students. By George Clinton Andrews. 4t ed. Phil. and London, W. B. Saunders Co 1954. Pp. 877. 777 illus.

La Valvola Mitrale: Aspetti anatomic fisiologici, clinici e chirurgici. Per Michel A. Chiechi e Charles P. Bailey (sic). Rom Pensiero Scientifico Ed., 1954. Pp. 561. Illu

The History of the Samaritan Free Hosp tal, with an Appendix on the London Ho pitals and Infirmaries. By Arnold Whitak Oxford. Cambridge, W. Heffer & Sons, Ltd 1931. Pp. 96.

Patología del Estomago Operado: II Con greso Argentino de Gastroentoerología, Ma del Plata, 13-18 de Abril de 1953. Contrib tors from Sociedad de Gastroenterología Buenos Aires, Asociación Argentina de R diología, and Sociedad Médica de Mendoz Buenos Aires, Ed. Universitaria, 1954. P 482. Illus.

Verhandlungen der Deutschen Gesel schaft für Chirurgie, 70 Tagung, 7-11 Apr 1953. Berlin, Springer Verlag, 1953. Pp. 76

Illus. (Langenbecks Archiv für Klinische Chirurgie, Band 276.)

The Antiseptic (Madras), Golden Jubilee Number, April, 1954. Pp. 233-732.

Harofe Haivri, the Hebrew Medical Journal (New York), Vol. I, 1954. Pp. 256.

BOOKS REVIEWED

Sandoz Atlas of Hematology. Basel, Switzerland: Sandoz Limited, 1952.

This book is an enlarged and expanded version of the Atlas published in French and German by the same firm in 1949. It represents a magnificent undertaking.

The Atlas is made up of three parts. The first part covers the fundamental principles of hematology, and under this heading terminology, classification, origin of blood cells, and normal and abnormal hemopoietic elements are covered. The technic of blood and marrow examination, forms for recording and reporting results, and lists of normal values make up the rest of the section. The parts dealing with the technics and normal values are unusually good and comprehensive. There are minor points in technic with which the reviewer is in disagreement, such as the method of preparing blood and marrow smears and the failure to comment on the need for disposable lancets or needles in puncturing the finger in order to prevent the transmission of infectious disease, especially hepatitis.

The second part deals with the morphology of blood cells and goes into considerable detail in describing both blood cells and indigenous and foreign marrow cells.

The third part, which really is the most important and actually comprises the Atlas, is made up of some 256 illustrations, containing 579 photographs, all in color. For the most part, the cells are shown, 1200 times magnified, and practically all normal and pathologic forms of both peripheral blood and marrow cells are illustrated. The photographs, with few exceptions, are extraordinarily good as to detail and color reproduction. In many instances different stains of the same cells are used to illustrate differential points.

Here and there minor objectionable features appear; for example, the page dealing with investigations of iron therapy, which seems out of place; the interpretation of blast forms as eosinophiloblasts, and the like; but, except for these relatively unimportant objections, the book represents a tremendous amount of work and extremely skillful photographic reproduction. It is an Atlas highly recommended to teachers and students alike, since it is superior to anything previously published.

STEVEN O. SCHWARTZ, M.D.

The Hepatic Circulation and Portal Hypertension. By Charles S. Child and others. Philadelphia: W. B. Saunders Company, 1954. Pp. 444, with illustrations and 7 appendices.

At the end of this book there are 38 case abstracts to demonstrate practical application of the principles detailed in the substance of the text.

The authors have drawn liberally from Elias' conception of hepatic histology and physiology. The anatomy, physiology, pathologic-physiology, and attendant microscopic anatomy and changes therefrom are detailed so well that when the chapter on portal hypertension is reached it is well understood and digestible. The hepatic function tests are described in relation to the selection of patients for proper portal decompression. Preoperative and postoperative regimens are well described. The experimental work on Macaca mulatta monkeys make up the first four appendices. The surgical treatment is dealt with in relation to pancreatico duodenectomy and carcinoma. The authors have put together a wonderful monograph on hepatic physiology and pathology. Many previously unassociated phenomena are revealed to be one pathologic-physiologic syndrome.

This book is highly recommended for internists generally and abdominal surgeons in particular. One can not learn too much about hepatic pathology. There are too many functions of the liver that are not well understood.

JEROME J. MOSES, M.D.

Die Brustdrusenerkrankungen. By Josephine Stahl and Hans-Joachim Englert. Berlin: Georg Thiem-Leipzig, 1954. Pp. 166.

The authors review briefly the prese knowledge of diseases of the breast. T book is logically written, being divided in chapters on the anatomy, ph [illegible]gy, ho monal diseases, and neopla [illegible] f the breast. The American reader will be partly unfamiliar with the classification the authors give, which appears to be a mixture of the old classic German classification and the more modern classification used in this country.

It seems unfortunate that scirrhous carcinoma and medullary carcinoma, which are descriptive terms, are used parallel to diagnostic terms such as ductal carcinoma and adenocarcinoma.

The authors cite the modern literature, although some of the most recent articles apparently have not been available to them. A number of controversial statements are, in a book like this, unavoidable, but one must take exception to the statement that cystosarcoma phylloides should be considered a benign tumor. The latest summary on this tumor, published in *Cancer* in November 1951 (Treres and Sunderland) is apparently unknown to the authors.

The book contains a large number of excellent photographic reproductions. All in all, it is a diligently written book.

WERNER F. EISENSTAEDT, M.D.

Cerebral Vascular Disease. By James Peter Murphy. Chicago: The Year Book Publishers, Inc. 1954. Pp. 408.

This timely and interesting book, written by a neurosurgeon, will be of great value to the general practitioner and internist as well as to the pediatrician and geriatrician, and even the neurologist will find much worthwhile information.

In the ever-widening field of cerebrovascular diseases an increasing understanding of the physiopathologic conditions of cerebral circulation and an evaluation of new clinical and laboratory methods allow the surgeon to handle the individual case more judiciously than ever. The initial chapters of the book, dealing with embryology, anatomy, physiology and the nerve supply of the intracranial vessels, make fascinating reading. As a few examples of recently extended knowledge in this field one may mention observations in aviation medicine as to the influence of gravitational pressure, experience with angiography, carotid ligation and stellate block, electro-encephalographic studies and data collected in operations performed under hexamethonium—induced hypotension.

With regard to therapy, nicotinic acid as well as papaverine is considered effective in increasing cerebral vascular irrigation. Stellate block may be of considerable benefit for acute ischemia of the brain. It is most efficient in intracranial vasospasm. However, since one can never know exactly what part angiospasm plays in the cerebrovascular accident, stellate block may be used for any type of nonhemorrhagic stroke. Results are much better with spasm and embolism than with thrombosis.

The chapters about infarction without thrombosis and about the inflammatory and collagenous diseases leading to cerebral vascular accidents are of special interest. The book is beautifully illustrated with fine photographs and diagrams.

ERNST HAASE, M.D.

Nerve Blocks: A Manual of Regional Anesthesia for Practitioners of Medicine. By John Adriani. Springfield, Ill.: Charles C Thomas, Publisher, 1954.

This book is written in the same outline form as Dr. Adriani's popular book, *Techniques and Procedures of Anesthesia.* The book is designed primarily for practitioners in all walks of medical practice.

The more common blocks are covered in a clear outline, the material being presented in the following fashion: Definition, Anatomy, Materials, Technique, Landmarks, Procedure, Anesthesia Complications and, finally, Comments. With his vast experience, Dr. Adriani has been able to present the material in a concise, neat and easily digestible manner. Details are kept to the minimal amount necessary to accomplish this.

The book opens with a section on the various aspects of general anesthesia and then follows in an orderly fashion with presentation of the various nerve blocks. The different blocks are quickly and easily located because of the neatness of presentation.

This book is ideal for the student, the surgeon and the anesthesiologist as a quick, easy reference that gives the essential information they require.

MAX S. SADOVE, M.D.

Abstracts from Current Literature

Nosny, B.: Nine Cases of Homograft of Os Calcis for Closed Comminuted Fractures Following Mine Explosions. J. de chir. 70: 572, 1954.

During the war in Indo-China, damage to the os calcis due to mine explosions constituted one of the major problems of lower limb injuries. Such lesions, varying from a simple subthalamic crack to complete disruption of the bone, may fall into one of the following categories:

1. Fracture in the frontal plane, through the sinus of the os calcis, separating the anterior tuberosity, which is itself damaged. The base of the tuberosity is pulled upward by the peroneus longus. The posterior tuberosity, now freed, is pulled by the tendo Achilles. The plantars are caved in.
2. Crushing of the subthalamic spongiosa, leading to its sinking. The thalamus itself often escapes damage.
3. Detachment of the sustentaculum tali, which slips into the canal of the os calcis, pulling with it the head of the talus.
4. Sagittal fracture separating the plantar tuberosities and interrupting the posterior plantar rest.

These fractures may be isolated, multiple or associated with neighboring lesions. They are therefore mainly complex and have a poor functional prognosis. Wartime explosions complicate them further with soft tissue damage and vascular phenomena. In fact, for the author, the progress of arterial or venous thrombosis dictates the immediate prognosis.

The failure of the classic methods of treatment of these serious fractures of the calcaneum has led the author to devise a new technic by using homologous grafts of os calcis taken from the cadaver. With such a new os calcis and a calcaneocuboidal and calcaneotalic double arthrodesis he has been able to obtain better results.

The graft is taken from the fresh cadaver after radiologic comparison with the patient's os calcis. It is trimmed according to measurements, introduced into its receiving bed and held in place by a double arthrodesis. The operation respects all the tendons and the tibiotarsal and the talonavicular articulations. Reconstituting thus strictly the skeletal architecture of the foot, it permits a functional improvement next to normal.

Nine patients were treated by this method, with good anatomic and functional results. Convalescence and rehabilitation are much shortened.

Excellent roentgenograms and other illustrations enrich this valuable work. The operative technic is described in detail. The book should be consulted by everyone interested.

S. A. Gueukdjian, M.D.

Operations for Coronary Artery Disease. Beck, C. S., and Leighninger, D.S., J.A.M.A. 156:1226-1233 (Nov. 27) 1954.

As a result of many years of experimentation, the authors have developed a direct surgical attack upon the coronary vessels in an effort to protect the heart after a major coronary occlusion. The principle involved is the establishment of a small but adequate blood supply to the critical areas of the myocardium.

For this purpose two operations are proposed. The first consists of abrasion of the epicardium and the lining of the parietal pericardium by application of an inflammatory agent (0.2 Gm. of powdered asbestos) to these surfaces, then partially occluding the coronary sinus where it enters the right auricle and grafting the parietal pericardium and mediastinal fat to the surface of the heart. The second consists of shunting arterial blood into the coronary sinus by placing a free vein graft between the aorta and the coronary sinus or by direct anastomosis between these structures; then, two to three weeks later, partially occluding the coronary sinus where it enters the right auricle. The partial occlusion raises the pressure of the blood in the sinus, which results in a retrograde flow.

In all, 186 patients were operated upon for disease of the coronary artery. The mortality rate for the 108 patients operated upon from 1951 to 1953 was 2.8 per cent from thoracotomy alone, 7.5 per cent from the No. 1 operation and 26.1 per cent from the No. 2 operation. Of the last 27 patients operated upon 1 died of thoracotomy alone and 1 from th coronary operation.

The most acceptable type of patient for operation is a lean person in the forties or fifties who has had coronary disease for a year or more and who has pain but is able to get around. There is no age limit for the operation. Patients with heart failure and patients in whom the heart is giving way and enlarging are not candidates for the operation.

A follow-up of the patients operated upon showed that 4 out of 5 had obtained either complete relief or marked reduction of pain. Their chances of returning to work were equally good.

At present, the surgical risk has been materially reduced as a result of experience. Each type of operation has proved beneficial. The No. 2 operation reduces the rate and the size of the infarct to a greater extent than does the No. 1 operation. The backflow measurements obtained are also greater. The drawbacks to the performance of this operation are the necessity of special training and the use of a two-stage procedure. Because the authors have not been able to achieve the high standard of benefit of the No. 2 operation owing to the fact that blood from outside sources may not be delivered to the myocardium by this operation over a long period, they are at present doing the No. 1 technic.

M. O. CANTOR, M.D.

Bacteriology of Burns Treated by Exposure. Lowbury, E. J. L.; Crockett, D. J., and Jackson, D. M., Lancet 2:1151-1154 (Dec. 4) 1954.

In a bacteriologic study of a large number of burns, the authors attempted to determine the validity of the premise upon which the exposure method is based. "The exposure method of treating burns has been recommended on the ground that a dry surface, such as that which forms over an exposed burn, does not favor bacterial growth."

As a result of their bacteriologic studies the following conclusions were made:

1. Burns treated by exposure yielded heavy growths of Staphylococcus aureus, Streptococcus pyogenes and Pyocyaneus in addition to other pathogens from the inner surface of eschars when the dry outer surface yielded scanty bacterial growth on culture.
2. Exposed burns of the face showed a higher incidence of acquired S. pyogenes than did burns of other regions. The lowest incidence of S. pyogenes and Pyocyaneus was observed on burns of the hands and feet which could be adequately covered and were dressed with penicillin cream in an air-conditioned dressing room.
3. Burns of the trunk treated by exposure showed S. pyogenes and Staph. aureus slightly more often than did similar burns treated by the closed method.
4. Pyocyaneus and coliform bacilli were commoner in closed than in exposed burns.

The authors emphasize the fact, however, that this study was not undertaken to determine the relative merits of one method of treatment over another, but merely to point out that the premise involved is not supported by their data. A place exists for both kinds of treatment.

M. O. CANTOR, M.D.

Extended Transthoracic Oesophagogastric Myotomy in the Treatment of Idiopathic Megaoesophagus (Variant of Heller's Operation, Transthoraco-abdomino-Oesophagogastrodiaphragmaplasty). Alivisatos, C. N., J. de chir. 70:464, 1954.

It is now generally agreed that Heller's classic cardiomyotomy by the abdominal approach is an inadequate and uncertain operation. One of the main reasons for this is that it permits an insufficient longitudinal incision of the esophageal muscularis.

The need for extending the esophagogastric seromuscular incision has led surgeons to attack the operation by the left thoracic route.

The author describes a personal technic of extended myotomy. He bases his variant on Bérard's physiologic observation that the diaphragmatic contractions exercise an influence on the opening of the esophagus; they diminish its caliber, and this compression prevents the reflux of gastric contents into the esophagus.

With the intention of surgically amplifying this physiologic action, the author approaches the two lips of the esophageal seromuscularis to the lips of the longitudinal opening of the diaphragm. The operation thus constitutes an esophagogastrodiaphragmaplasty. It is performed by a transthoracoabdominal approach. It has been tried in 4 cases, with satisfactory results.

S. A. GUEUKDJIAN, M.D.

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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COLLÈGE INTERNATIONAL DES CHIRURGIENS
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FOUNDED BY DR. MAX THOREK

The Journal of the
International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Vol. XXIII APRIL, 1955 No. 4

Original Articles

Complications of Meckel's Diverticulum in Infants and Children

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AND
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According to figures derived from necropsy reports, Meckel's diverticulum occurs in approximately 2 per cent of all persons. It is well known that this lesion may give rise to serious complications, which occur predominantly in the first or second decade of life. The pediatrician and the pediatric surgeon should bear in mind the possibility of its presence in the differential diagnosis of surgical conditions of the abdomen, for it requires early surgical intervention.[1]

This paper presents a series of 6 cases of Meckel's diverticulum observed in children aged from 5 months to 8 years.

Incidence. — The incidence of Meckel's diverticulum varies, according to various reports, from 1 to 2.5 per cent and is higher in the male than in the female in the ratio of 2:1. All our patients were observed in the first decade of life; of the 6 children, 4 were boys and 2 were girls.

Embryologic Aspects.—Meckel's diverticulum results from incomplete obliteration of the vitelline duct, which in early fetal life connects the yolk sac with the intestine. By the 7 mm. stage this connecting stalk is completely atrophied and closed, and the resulting fibrous cord is subsequently absorbed. Failure of all or part of the vitelline duct to become obliterated results in various types of this anomaly, which have been grouped by Thompson[2] as follows:

1. Typical diverticulum, given off from the antimesenteric side of the ileum and lying free in the peritoneal cavity, the distal extremity being closed.
2. Partial obliteration, with a rous band running fr t h diverticulum t

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Submitted for publication Nov. 17, 1954.

some adjacent structure.

3. Umbilical fistula.
4. Giant diverticulum, sometimes coming off from the mesenteric side of the ileum and developing between the folds of the mesentery.
5. Umbilical polyps, either attached to the remains of the omphalomesenteric duct inside the abdomen or entirely cut off from the internal connection.
6. Simple intramesenteric variety.

Anatomic Aspects.—Meckel's diverticulum averages 3 to 8 cm. in length, and the diameter of its lumen is, as a rule, slightly less than that of the adjacent bowel. It is usually cylindric, with a tapering end, but a terminal bifurcation has been reported. Large diverticula (over 50 cm. long) have been observed, but some authors (Ladd and Gross[3] included) have expressed the opinion that these giant diverticula represent duplications of the intestinal tract.

The location of Meckel's diverticulum varies, but the lesion occurs most commonly in the terminal portion of the ileum, although its presence over 100 cm. from the cecum has been reported.

An interesting feature of Meckel's diverticulum is the heterotopic mucosa that sometimes lines its walls. Although the mucosa of this diverticulum, in the majority of cases, is that of the intestine from which it takes origin, in 15 to 25 per cent of all cases heterotopic tissue has been observed; gastric, duodenal, jejunal and colonic mucosa, as well as pancreatic tissue, have been reported; gastric mucosa has been the type most commonly present.

Several theories have been advanced to explain the presence of heterotopic tissue in Meckel's diverticulum, the analysis of which is beyond the scope of this paper.

Pathologic Picture.—Meckel's diverticulum may not give rise to clinical manifestations at all; it may be incidentally detected during an operation for some other condition or may undergo pathologic changes responsible for serious abdominal conditions.

The surgical complications of Meckel's diverticulum may be grouped as follows (Greenblatt, Pund and Chaney[4]):

1. *Peptic Group:* Here the heterotopic gastric mucosa is of paramount importance, for, as it is capable of producing hydrochloric acid and pepsin, it is responsible for the peptic ulceration that occurs in such cases. The ulcers are commonly observed at the base of the diverticulum (Fig. 2*A*) and may produce perforation, hemorrhage or both.

2. *Obstructive Group:* Meckel's diverticulum may be the cause of intestinal obstruction; it may act as an axis about which the loops of bowel rotate to form a volvulus, or it may be followed by a band that adheres to any peritoneal surface (Fig. 1), forming an opening through which various forms of intestinal strangulation may take place. On the other hand, Meckel's diverticulum may be the leading point of an intussusception.

3. *Diverticulitis Group:* Meckel's diverticulum may be the seat of inflammatory changes, which may be acute or chronic and may closely simulate acute appendicitis. Perforation may occur, and the ensuing peritonitis is extremely severe. Meckel's diverticulum is a blind sacculation, and when its mouth is small or constricted inflammation may occur.

4. *Umbilical Group:* If Meckel's diverticulum is still attached to the umbilicus there is discharge of yellow or yellowish-brown fluid or even fecal material from the umbilicus. Diagnosis is easy in such cases.

5. *Tumor Group:* Several types of tumor have been reported as involving Meckel's diverticulum, but in a low incidence.

In the obstructive group, usually a diagnosis of obstruction is made, but in most instances the diagnosis of diverticulum is not made.

When an umbilical fistula is present, the differentiation must be made between a patent omphalomesenteric duct and a patent urachus. Roentgen demonstration of communication with the intestines rules out the latter.

Treatment.—Once it gives rise to complications, the treatment of Meckel's diverticulum is surgical removal. A diverticulum that has not produced symptoms but is discovered in the course of surgical intervention should also be removed, provided the patient's condition is satisfactory. Obviously, when the diverticulum is responsible for any surgical abdominal condition its removal is imperative. One point should be kept in mind; a purse-string suture and turning in of the stump should never be employed, for constriction of the lumen may result. Excision is best performed in simple cases, when the diverticulum has a thin base, by cutting it between two clamps obliquely placed across its base and then closing the bowel. When the base is broad and thickened, owing to the presence of gastric mucosa, pancreatic tissue or inflammation, it is better to employ a wedge-shaped incision, resecting the diverticulum and following this with repair of the defect, using two rows of sutures. In some cases resection of a segment of bowel along with the diverticulum may be necessary and must be followed by primary anastomosis.

REPORT OF CASES

Case 1.—V. L. D., a girl aged 8, was admitted to the hospital with a history of abdominal pain and bloody stools since infancy. Blood in the stool was first noticed when she was 6 months old, and since then she had always been pale and frail; she used to cry constantly, complaining of abdominal pain, which in the few months prior to admission had become more severe.

After adequate preoperative treatment, which included blood transfusions to correct the anemia, the child was operated on; a Meckel's diverticulum 6 cm. long with a broad base, was discovered about 60 cm. from the cecum. A thin fibrous cord followed its tip and was attached to the mesentery (Fig. 1). This cord was severed, and by means of a wedge shaped incision the diverticulum was removed; repair of the defect followed, with two rows of sutures. The postoperative period was uneventful.

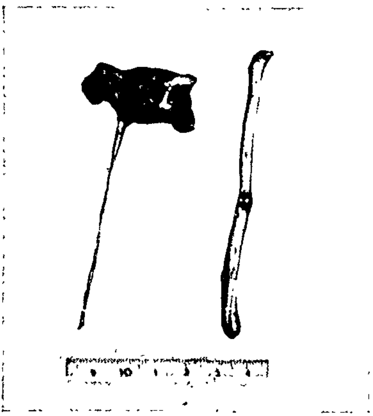

Fig. 1.—Photograph of Meckel's diverticulum and appendix removed at the same operation. The fibrous cord connected the diverticulum to the mesentery.

Histologic examination of the specimen revealed gastric mucosa with ulcertation.

Case 2.—C. A. P., a 2½-year-old boy, was admitted to the hospital with a history of abdominal pain of forty-eight hours' duration, with nausea and vomiting. Tarry stools had been noticed twenty-four hours prior to admission. Physical examination revealed the boy to be pale and in distress. Abdominal tenderness and distention were present. The temperature was 37.2 C. and the pulse rate 130. At operation the peritoneal cavity was observed to be full of blood, and blood clots were seen in the right lower quadrant. Further inspection revealed a small, thick Meckel's diverticulum, located 20 cm. from the cecum, with a definite artery and mesentery of its own. A perforated ulcer was seen in its base, with a diameter of approximately 0.5 cm. Excision of the diverticulum was carried out by

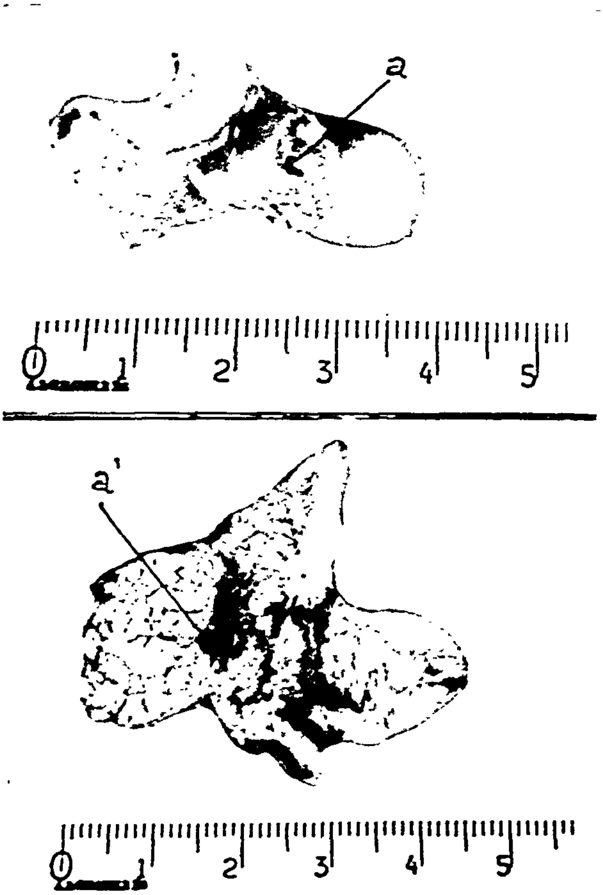

Fig. 2.—*Above*, perforated peptic ulcer (*a*) in a case of Meckel's diverticulum. *Below*, perforated peptic ulcer (*a'*) in a case of Meckel's diverticulum (same case as shown in *a*).

the wedge-shaped incision method. Recovery was uneventful (Fig. 2).

Histologically, gastric mucosa was observed.

CASE 3.—V. L. A. B., a 5-month-old girl, had jaundice since four days after birth. The condition was steady and progressive and was diagnosed as congenital atresia of the bile ducts. On exploration of the bile ducts a Meckel's diverticulum was detected. It was attached to the umbilicus, but its distal end was not patent. The diverticulum was removed according to Ladd and Gross' method.

CASE 4.—R. O. R. F., a 5-year-old boy, was admitted to the hospital because of abdominal pain of three days' duration, without vomiting. Physical examination revealed him to be acutely ill; abdominal palpation showed generalized tenderness and muscle spasm in the right lower quadrant. The temperature was 37.8 C. A preoperative diagnosis of appendicitis was made. Laparotomy revealed a normal appendix. On further examination a Meckel's diverticulum 6 cm. long was found 30 cm. from the cecum, acutely inflamed at its tip. Diverticulectomy was performed. Recovery was uneventful. Microscopic examination revealed no heterotopic tissue (Fig. 3*A*).

CASE 5.—R. F. F., a boy aged 6 years, was admitted to the hospital with a history of abdominal pain of twelve hours' duration, which became worse in a few hours and was followed by nausea and vomiting. Physical examination revealed abdominal tenderness and muscle spasm in the umbilical region. Laparotomy revealed a normal appendix. Further exploration showed a Meckel's diverticulum 40 cm. from the cecum, with a broad base, but short (1.5 cm.), with an artery and mesentery of its own; the diverticulum was definitely inflamed (Fig. 3*B*). Diverticulectomy was performed and recovery was uneventful.

No heterotopic tissue was revealed by histologic examination.

CASE 6.—D. V., a boy aged 3 years, had abdominal pains of five days' duration, followed by nausea and vomiting. Anorexia and abdominal distention were present. The temperature was 38 C. Abdominal tenderness and muscle spasm were noted in the periumbilical region. Laparotomy revealed a Meckel's diverticulum, with a broad base, marked signs of inflammation and a perforation at its base. A segment of bowel was resected along with the diverticulum, with primary anastomosis. Recovery was uneventful (Fig. 4).

No heterotopic tissue was revealed by histologic examination.

6. *Incidental group.*

Signs and Symptoms.—It has already been mentioned that Meckel's diverticulum may remain symptomless through life, but, on the other hand, it may give rise to serious abdominal conditions.

Abdominal pain is one of the main symptoms and may vary according to the condition that involves the diverticulum. It may simulate acute appendicitis by its character and location; it may be generalized, occurring in waves, in cases of intestinal obstruction or intussusception, or it may be sharp and sudden in cases of perforation. In some instances the pain is dull and vague.

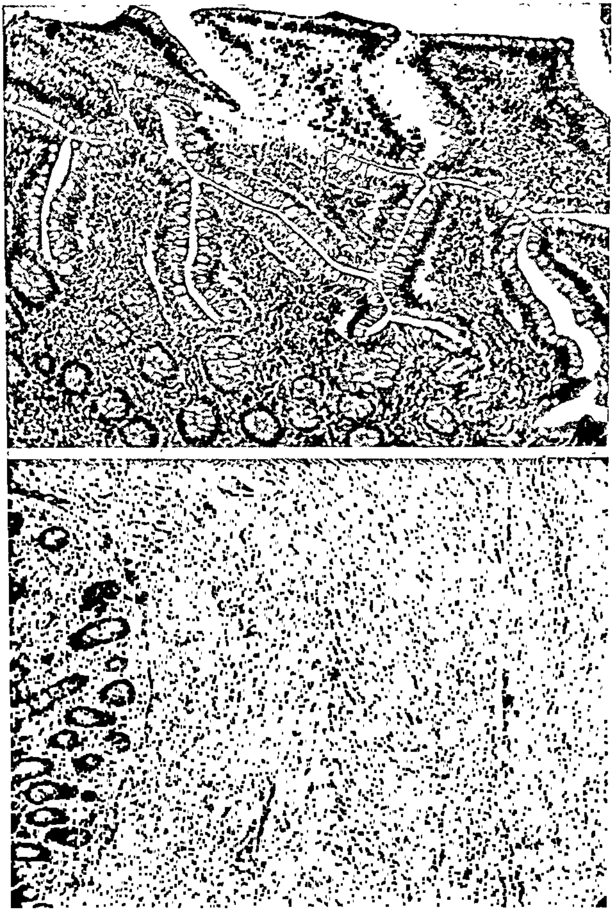

Fig. 3.—*Above*, mucosa of intestinal type, showing villosities and characteristic epithelial lining. × 300. *Below*, diverticular wall with interstitial edema, vascular congestion and inflammatory infiltration. × 200. (The author's gratitude and appreciation are extended to Dr. Antonio Cardoza de Alveido for his kind assistance in the microscopic examination of these specimens.)

Nausea and vomiting may also occur, mainly when there is obstruction, but they do not occur in every case.

Hemorrhage is a common and

Fig. 4.—Photograph of the resected specimen.

occurs in two forms, acute and massive or mild and recurrent. It is due to ulceration of heterotopic gastric mucosa and may lead to severe anemia.

Abdominal pain and hemorrhage may be associated with Meckel's diverticulum, but pain in such cases is usually mild and does not present the characteristics of pain due to intussusception.

Abdominal tenderness and rigidity may be the signs of diverticulitis and are usually localized to the umbilical and ileocecal region.

Temperature and pulse rate are elevated in the presence of diverticulitis, and the blood red cell count drops sometimes to very low levels.

Diagnosis. — Preoperative diagnosis of Meckel's diverticulum is rarely made, for the clinical signs of its complications are not specific and may be the signs and symptoms of other and more common acute abdominal conditions. As a matter of fact, such a diagnosis is possible only when an umbilical fistula can be diagnosed; when hemorrhage is a main manifestation, the presence of Meckel's diverticulum can be suspected. Otherwise the diagnosis is difficult or impossible.

Meckel's diverticulum has been roentgenologically demonstrated in a few cases. As a rule, however, intestinal series fail to show its presence, on account of the usually large mouth of the diverticulum, which provides adequate drainage of the contents of the diverticulum into the bowel.

Meckel's diverticulitis is indistinguishable from appendicitis, although some authors maintain that a few features may indicate the preoperative diagnosis of this condition, e. g., the type and location of pain, the area of maximum tenderness and rigidity, the intensity of vomiting and general manifestations. We have been unable to make such a differentiation; in all our cases of the diverticular group the condition was diagnosed as acute appendicitis.

Hemorrhage due to Meckel's diverticulum must be differentiated from intussusception, polyps in the colon and hemorrhagic diseases. In this group the diagnosis can be made tentatively, since these other causes have been excluded.

SUMMARY

A series of 6 cases of Meckel's diverticulum is presented, the patients being children (4 boys and 2 girls) from 5 months to 8 years of age. In 1 case the diverticulum was incidentally discovered in the course of a celiotomy; in 3 cases it was the seat of acute inflammation, and in 2 cases peptic ulcers were present, one of them perforated, with hemorrhage. In 5 cases microscopic studies were carried out, and in 2 of them heterotopic gastric mucosa was reported. In every instance diverticulectomy was performed. The mortality rate was zero.

SUMARIO

É apresentada uma série de 6 casos de divertículo de Meckel em crianças de 5 meses a 8 anos de idade, sendo 4 meninos e 2 meninas. Em 1 caso o divertículo foi acidentalmente descoberto no decurso de uma laparotomia; em 3 casos apresentava-se como sede de inflamação aguda; e em

2 casos havia úlceras pépticas presentes, uma das quais perfurada com hemorragia. Em 5 casos foi feito o estudo microscópico, sendo evidenciada mucosa gástrica enterotópica em 2 dêles. Em todos os casos foi feita a diverticulectomia, sem mortalidade operatória.

ZUSAMMENFASSUNG

Es wird ueber eine Serie von sechs Faellen von Meckelschem Divertikel bei Kindern im Alter von fuenf Monaten bis zu acht Jahren, vier Knaben und zwei Maedchen, berichtet. In einem Falle wurde das Divertikel zufaellig im Verlaufe einer Bauchoperation entdeckt; in drei weiteren Faellen war das Divertikel der Sitz einer akuten Entzuendung, und in den beiden uebrigen Faellen fanden sich im Divertikel peptische Geschwuere, eines davon perforiert, mit Blutungen. In fuenf Faellen wurden mikroskopische Untersuchungen ausgefuehrt, und in zwei dieser Faelle wurde versprengte Magenschleimhaut gefunden. In allen Faellen wurde das Divertikel reseziert. Es kam zu keinem Todesfall.

RIASSUNTO

L'autore descrive 6 casi di diverticolo di Mackel in bambini da 5 mesi a 8 anni di età. Si trattava di 4 maschi e 2 femmine. Nel primo di essi il diverticolo fu una scoperta occasionale nel corso di una laparatomia; in 3 vi fu una diverticulite acuta, in 2 un'ulcera peptica (una delle quali perforata e sanguinante). Si fecero gli esami istologici e si trovò mucosa gastrica eterotopica in 2 diverticoli. Su 6 resezioni del diverticolo non vi fu neppure un decesso.

RÉSUMÉ

L'auteur présente une série de six cas de diverticule de Meckel; il s'agit d'enfants de mois à 8 ans, 4 garçons et 2 filles. Dans un cas le diverticule a été découvert incidemment au cours d'une laparotomie abdominale. Dans trois cas il était le siège d'une inflammation aiguë, et dans 2 cas il y avait des ulcères peptiques, dont l'un était perforé, avec hémorragie. Des examens microscopiques ont été pratiqués dans 5 cas; dans deux d'entre eux le rapport indiquait une muqueuse gastrique hétérotopique. Dans chacun de ces cas une diverticulectomies a été pratique. Mortalité nulle.

RESUMEN

Se presentan seis casos de divertículo de Meckel, siendo los pacientes niños de 5 meses a 8 años de edad, 4 hombres y 2 mujeres. En un caso el divertículo se descubrió incidentalmente en el curso de una celiotmoía, en 3 casos fué asiento de inflamación aguda y en 2 casos de úlcera péptica, uno de ellos se perforó con hemorragia. Se hicieron estudios microscópicos en 5 casos, habiéndose reportado en 2 mucosa gástrica. En todos los casos se hizo diverticulectomía. La mortalidad fué cero.

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Treatment of Advanced Mammary Cancer

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THE best treatment for cancer of the breast is radical operation with dissection of the adjacent lymph nodes. The overall five-year survival rate is 51 per cent. When the axillary glands are not involved with cancer, about 75 per cent of women survive five years after the operation; when there are axillary metastases, about 25 to 30 per cent live five years or more.

The challenge to surgeons is the question of what to do when cancer recurs or when cancer metastasizes. Two principal methods of treatment are available for advanced mammary cancer; irradiation and modification of the endocrine status of the patient.

Irradiation is extremely valuable, although it is essentially a local form of treatment. The relief is symptomatic and palliative, but there is no evidence that life is prolonged by this therapy. The radiologist treats metastases in various sites and obtains worthwhile alleviation. However, in the course of treatment, he often has to pursue new foci as they develop. Prolonged irradiation in such cases often causes undesirable and dangerous complications: 1. The limit of tolerance of normal tissue overlying the lesion is reached. 2. Much destruction of bone marrow leads to agranulocytosis and anemia. 3. The tendency to bleeding is increased. Under these circumstances irradiation must be abandoned.

The endocrine treatment of disseminated mammary cancer is more general, and in appropriate cases profound regression of the neoplasm occurs for shorter or longer periods. This method is based on modification of the tumor-host relation, which is a critical factor in determining how rapidly a cancer will grow. The methods available are: (1) Excision of the gonads; (2) administration of androgens; (3) administration of estrogenic compounds, and (4) adrenalectomy. These methods will be discussed briefly one by one.

Oophorectomy.—Castration is valuable primarily as a palliative procedure. Surgical castration essentially guarantees permanent eradication of ovarian activity; the efficacy of irradiation in this respect is less certain. Ovariectomy effects regression of about 25 to 30 per cent of mammary cancers. Benefits occur in the primary growth, in the metastases and in the patient's general health which, in a few cases, are remarkable. Most of the beneficial results seem to occur in premenopausal women. The remission in most cases lasts for about six to twelve months. Extended remission, however (for three to five years) has been reported.

Androgen. — Androgen benefits advanced mammary cancer in some cases, but the mechanism of its action is not certain. It is known, however, that testosterone favors protein synthesis, which is desirable in patients with cancer. Androgen appears to be most efficacious in producing favorable effects on bony metastases from mammary cancer. About 20 to 25 per cent of the patients so treated are benefited. The osseous metastases respond to androgen by a filling in of osteolytic lesions and by increased density of bone.

From the Ben May Laboratory for Cancer Research, University of Chicago.

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Sept. 24, 1954.

The osteoblastic changes in bone are associated with an increase of alkaline phosphatase in the serum.

The most common androgenic compounds used nowadays is testosterone propionate, given by injection, and tablets of methyl testosterone, given orally. The mean survival time after androgen therapy is eight and seven-tenths to thirteen months.

Side effects from the administration of testosterone are very common. Edema may occur because of retention of salt and water. Care should be exercised in the administration of testosterone to elderly hypertensive patients. Other complications are hirsutism, change of voice, acne, hot flashes and, worst of all, increase of libido.

Estrogens. — The observation of an ameliorative effect of estrogens on certain patients with advanced cancer of breast is completely empiric. Its mechanism of action is unknown. Estrogen should be used only in women who have been postmenopausal for five years or more. The best results are generally obtained in elderly patients. Estrogen is most efficacious in causing regression of the soft tissue lesions of mammary cancer. Ulcerations may heal; the gross tumor, the lymph nodes and the pulmonary and hepatic metastases may become diminished. Osseous metastases in postmenopausal women may calcify, but this occurs only after prolonged treatment. Estrogen results in objective improvement in about 20 to 25 per cent of the cases. Diethylstilbestrol is the common estrogenic compound used. The mean survival time after estrogen therapy is seven and four-tenths to eight and four-tenths months.

Side effects from estrogenic treatment are edema, vaginal bleeding, nausea, vomiting, pigmentation of the areola and sometimes incontinence.

Adrenalectomy. — Regression of mammary cancer after oophorectomy has proved that hormones formed in the ovary can sustain cancer of the breast. Lacassague first induced mammary cancer in mice after the administration of estrone. This proved that estrogenic substances are importantly involved in mammary cancer. Woolley, Little and Fekete found that early gonadectomy in certain strains of mice led to hypertrophy and tumors of the adrenal cortex and later to the malignant tumors of the breast in these animals. In our laboratory we have observed that women who have undergone oophorectomy often continue to excrete significant and even large amounts of estrogenic compounds in the urine. It is therefore clear from these observations that the adrenal cortex is another focus where estrogenic hormones are produced. These considerations led to the employment of adrenalectomy for mammary cancer. The availability of cortisone and desoxycorticosterone make adrenalectomy a feasible operation. The hormonal substitution therapy consists essentially of a large initial replacement dose of cortisone acetate and DOCA, required to insure the prevention of adrenal insufficiency, to be followed by a gradually decreased dose until the maintenance dose is reached in a week. Criteria for adequate substitution are the prevention of any sign or symptoms of adrenal insufficiency. Maintenance of electrolyte and carbohydrate balance and of adequate blood pressure without orthostatic hypotension are the best indicators. When maintained adequately, adrenalectomized patients have a healthy appearance, are not incapacitated and are able to engage in all of their usual activities.

In a series of 100 operations for advanced mammary cancer performed by Dr. C. B. Huggins and myself within three years, 1951 to 1953 inclusive, 95 patients had been subjected earlier to either unilateral or bilateral mastectomy. All patients had been treated with hormonal therapy (13—premenopausal) of one kind or another after the onset of metastases. The period of observation since adrenalectomy has been nine to forty months or three years and four months. Assessment of response to adrenalectomy was based entirely upon the observed regression of tumor tissue. Subjective improvement alone was disregarded.

Of these 100 patients, 5 died postoperatively, a mortality rate of 5 per cent. Of the 95 cases, in which treatment was effective, 38 patients, or 40 per cent, are aving or have had profound regression the lesions. Fifty-seven, or 60 per cent f the total, did not respond to adrenalectomy. Regression of tumor occurred in both soft tissue and bone.

Regression of soft tissue metastases consists of disappearance of local recurrent lesions, metastatic pleural and pulmonary lesions, metastatic lymph glands and healing of cancerous ulcers. Regression of bone metastases consists of roentgen evidence of healing of pathologic fractures and filling in and sclerosis of osteolytic metastases and actual new bone formation. Most of these patients were incapacitated by intractable bone pains and compression fractures of the spine: they subsequently became able to walk and resume normal physical activity.

In accordance with the roentgen evidence of regression of lesions in bones, there is an elevation of alkaline phosphatase in the serum. The elevation of the level of this enzyme indicates marked osteoblastic activity of the bones in the absence of disease of the liver. This elevation usually is followed by a decline to normal values. This rise of the alkaline phosphatase level, with subsequent decline concomitant with healing of osseous metastases, is similar to that occurring in prostatic cancer after orchiectomy.

The beneficial effects of adrenalectomy for advanced mammary cancer have thus been clearly shown. Since adrenalectomy produces a favorable response in less than 50 per cent of patients so treated and since it is a surgical procedure of some magnitude, the proper discrimination of candidates for the therapy is of great importance. Four criteria are used by us in the selection of patients for adrenalectomy:

1. Age between 40 and 45. The greatest relief has been observed in patients of this age.
2. A prolonged interval between mastectomy and the appearance of metastases. The rapidity of growth of cancer often indicated the degree of malignancy.
3. A high titre of estrogen excretion in the urine, which indicates significant hormone production.
4. Adenocarcinoma. This neoplasm responds favorably to adrenalectomy.

We have observed that the formation of acini in cases of mammary adenocarcinoma is a positive process directly attributable to the secretion induced by hormones. Our theory is that the lumen cannot empty, it contains secretion. The elimination of critical amounts of supporting hormones from the internal environment of certain cancers alters the cell metabolism sufficiently to stop secretion, producing collapse of the acini and causing the cells to shrink, with subsequent involution of the tumor.

Finally, it must be emphasized again that with any treatment in medicine, particularly any treatment of some complexity, the question must be decided whether it is worth while for the patient. Adrenalectomy has induced important remissions in patients in whom irradiation and testosterone were ineffective. In this group of mammary cancers this surgical method has provided relief not otherwise possible at present.

SUMMARY

The surgical treatment of early mammary cancer is a relatively simple procedure. The results are often encouraging and the five-year survival rate following the radical operation is high (5 per cent approximately). When cancer recurs or metastasizes, two principal methods of treatment are available: (1) irradiation and (2) modification of the endocrine status of the patient.

Irradiation is valuable as a local form of treatment. Prolonged irradiation causes undesirable complications and often compels the radiologist to abandon irradiation therapy.

The endocrine methods in treatment of disseminated mammary cancer are more general and more effective in appropriate cases. Four principal methods of endocrine therapy are discussed. They are (1) excision of the gonads; (2) administration of androgens; (3) administration of estrogens, and (4) adrenalectomy.

Bilateral adrenalectomy is a recent development and was first carried out for the treatment of advanced cancer of the breast by Huggins and his colleagues at the University of Chicago in 1951. Adrenalectomized patients can be maintained on Cortisone without any ill effects. The results of adrenalectomy are most encouraging and at times spectacular. Forty-per cent of a group of entirely unselected patients were benefited by the surgical procedure; the longest period of survival after the operation has been forty months. The postoperative mortality rate after adrenalectomy is 5 per cent. The morbidity rate after adrenalectomy is 0. Regression of tumor occurs in soft tissue and osseous metastases. Relief of subjective symptoms is often immediate and dramatic. When responding to adrenalectomy the patient gains weight, regains her appetite (which has long been lost) and enjoys life like a normal person.

All patients on whom adrenalec
was performed had previously been tr
by roentgen irradiation and andro
or estrogenic hormones and had fail
respond. Adrenalectomy has provided
nificant remission in these patients,
otherwise possible at present.

RÉSUMÉ

La technique chirurgicale du cancer n
maire précoce est relativement sin
Les résultats sont souvent encourage
et le taux de survie cinq ans après l'op
tion radical est élevé (environ 51%).
deux méthodes principales en cas de
cidive cancéreuse ou de métastase s
1. l'irradiation, 2. la modification du st
endocrinien.

L'irradiation est rtès précieuse
qu'elle soit surtout un mode de traiten
local et palliatif. Elle soulage les sy
tômes mais il n'est pas établi qu'elle
longe la vie. L'irradiation suivie prov
souvent des complications indésira
telles que: 1. tolérance limitée des ti
normaux sus-jacents, 2. large destruc
de la moelle osseuse avec agranulcyt
anémie, augmentation de la tendanc
l'hémorragie. L'irradiation doit alors
abandonnée.

Le traitement endocrinien du car
mammaire disséminé est plus général
peut produire une régression néoplasi
à des degrés divers. Il y a quarte métho
principales: 1. exclusion des gonades
administration d'androgènes; 3. admi
tration d'oestrogènes; 4. adrénalectom

Les androgènes semblent donner
meilleurs résultats sur les métastases
seuses. Environ 20 à 30% des mala
ainsi traitées sont améliorées. Les ef
secondaires nécessitent souvent l'interr
tion du traitement (hirsutisme, chan
ment de la voix, acné, oedème, au er
tion de la libido).

Les oestrogènes [illegible] it
sés que chez les [illegible] a

la ménopause. Ils sont plus efficaces dans les cas de lésions des tissus mous. Une amélioration objective est constatée dans 20 à 25% des cas. Les effets secondaries du traitement sont fréquents (oedème, hémorragies vaginales, nausées, vomissements) ; il faut alors l'interrompre.

L'adrénalectomie bilatérale est une méthode récente. Elle a été utilisée par Huggins et ses collègues à l'Université de Chicago en 1951 dans des cas de cancer du sein avancé. Les malades adrénalectomisées peuvent être maintenues au cortisone sans effets nocifs. Les résultats de cette opération sont des plus encourageants et parfois spectaculaire. Les auteurs ont constaté une amélioration dans 40% des cas. La période de survie post-opéraoire la plus longue a été de 40 mois. Le taux de morbidité après adrénalectomie est de 0. On observe une régression de la tumeur dans les tissus mous et dans les métastases osseuses. La disparition des symptômes subjectifs est souvent immédiate. Lorsqu'elle réagit à l'adrénalectomie la malade augmente de poids, elle retrouve son appétit et peut à nouveau mener une vie normale.

Toutes les malades chez lesquelles les auteurs ont pratiqué l'adrénalectomie avaient subi un traitement préalable aux rayons X et une cure d'androgènes et d'oestrogènes, sans résultat aucun. L'adrenalectomie a provoqué une rémission qu'il est impossible d'obtenir par d'autres méthodes à l'heure actuelle.

RIASSUNTO

La ura chirurgica del carcinoma mammario, preso ai suoi inizii, è relativamente semplice. I risultati sono incoraggianti in quanto sopravvivenze di 5 anni dopo interventi radicali sono abbastanza frequenti (51% circa). Quando, invece, il cancro recidiva o dà metastasi si può ricorrere a due princiòali metodi di cura: 1) l'irradiazione; 2) la modificazione dello stato endocrino del paziente. L'irradiazione ha grande valore terapeutico, per quanto si tratti di una cura locale e palliativa Alcuni sintomi ne riescono influenzati, ma non vi sono dati che dimostrino che tale terapia allunghi la vita; per di più l'irradiazione, se prolungata nel tempo, è spesso causa di noise complicazioni, quali 1—una limitata tolleranza dei tessuti normali sovrastanti la lesione e 2—una grave distruzione del midollo osseo con consecutiva agranulocitosi, anemia ed aumento della tendenza alle emorragie. Nei casi in cui tali complicazioni si verifichino è bene sospendere l'irradiazione. La terapia endocrina dei cancri mammari metastatizzati ha una influenza più generale e in certi casi si può assistere alla regressione delle localizzazioni neopplastiche. I principali metodi per attuare tale terapia sono quattro: 1) castrazione; 2) somministrazione di androgeni o di; 3) estrogeni; 4) adrenalectomia. Gli androgen si dimostrano molto efficaci sulle metastasi ossee da carcinoma mammario. Circa il 20-30% dei casi così trattati riceve un beneficio dakla cura. Vi sono però degli effetti collaterali spiacevoli che talvolta costringono a interrompere la cura: l'irsutismo, le modificazioni della voce, l'acne, l'edema, l'aumento della libido. Quanto agli estrogeni, le osservazioni dei loro effetti benefici incerti casi di carcinoma mammario sono de tutto empiriche. Essi dovrebbero essere usati soltanto nelle donne in menopausa; i maggiori benefici si ottengono in quelle più anziane. Gli estrogeni sembrano capaci di far regredire le lesioni delle parti molli nel cancro mammario nel 20-25% delle pazienti. Anche con queste sostanze si hanno effetti collaterali: edema, emorragie vaginali, nausee e vomiti, tali da costringere spesso ad interrompere la terapia. La surrenalectomia bilaterale è stata proposta ed attuata di recente da Huggins e collaboratori (Chicago 1951). I pazienti vengono

trattati con cortisone, senza effetti spiacevoli. I risultati sembrano incoraggianti, e a volte addirittura clamorasi: il 40% dei casi trattati ebbe giovamento, e il risultato più durevole data da 40 mesi. Nessuna malattia dopo l'intervento; la regressione del tumore si verifica tanto in loco quanto nelle metastasi ossee, tutti i disturbi soggettivi regrediscono immediatamente e decisamente, la paziente riacquista il peso e l'appetito e riprende una vita normale. Bisogna dire che tutte le malate erano già state sottoposte a roentgenterapia e a terapia con andre geni o estrogeni, senza successo.

SUMARIO

O tratamento cirúrgico do câncer mamário inicial é relativamente simples. Os resultados são frequentemente animadores e a sobrevida de 5 anos após a operação radical se dá em taxa alta (aproximadamente 51 por cento). Quando há recidiva ou metastase do câncer, são dois os métodos de tratamento principais de que se dispõe: 1—irradiação e 2—modificação do estado endocrino do paciente.

A irradiação é de extremo valôr, embora seja essencialmente uma forma de tratamento local e paliativo. Alivia os sintomas, mas não há provas de que a vida seja prolongada por êsse meio. A irradiação prolongada frequentemente provoca complicações desagradaveis, tais como (1) tolerancia limitada do tecido normal suprajacente à lesão e (2) ampla destruição da medula óssea, levando à agranulocitose e anemias, com aumento da tendência à hemorragia. Nessas circunstâncias a irradiação deve ser abandonada.

O tratamento endocrino do câncer mamário disseminado é mais geral e, em casos apropriados, pode ocorrer a regressão do neoplasma de extensão variável. Há quatro métodos principais: (1) extirpação das gonadas; (2) administração de androgenos; (3) administração de estrogenos e (4) adrenalectomia.

Os androgenos parecem produzir os resultados mais favoráveis sôbre as metastases ósseas nos casos de câncer mamário. Cerca de 20 a 30 por cento dos pacientes assim tratados melhoram. Os efeitos colaterais da administração de androgenos são comuns e numerosos e frequentemente o tratamento tem que ser interrompido. Entre as complicações mais desagradáveis citam-se o hirsutismo a mudança de voz, acne, edema e o aumento do libido.

A observação de um efeito após o tratamento estrogenico em algumas pacientes com câncer adiantado da mama é de origem completamente empirica. Os estrogenos devem ser usados unicamente em mulheres após a menopausa e os melhores resultados são em geral obtidos em pacientes idosas. Os estrogenos são mais eficazes na regressão das lesões dos tecidos moles do câncer mamário. De 20 a 25 por cento das pacientes assim tratadas apresentam melhoras objetivas. O aparecimento de edema, hemorragias vaginais, nauseas e vomitos frequentemente obrigam à suspensão do tratamento.

A adrenalectomia bilateral é uma aquisião recente e foi pela primeira vez levada a efeito para o tratamento do câncer avançado por Huggins e seus colegas na Universidade de Chicago em 1951. As pacientes adrenalectomizadas podem ser mantidas pelo Cortisone em quaisquer consequências. Os resultados da adrenalectomia são muito anima
quêntemente espectaculares.
por cento de um grupo de p
selecionadas foram beneficiadas
tratamento cirúrgico; a sobrevi
longa após a operação foi de 40
A morbidade após a adrenalectomia
O. Ocorre regressão do tumor em tec
moles e eme metastases ósseas. O ali
dos sintomas subjetivos é frequentemente imediate e dramatico. Quando responde à adrenalectomia a paciente ganha pêso,

recupera o apetite (perdido há muito tempo) e gosa a vida como uma pessôa normal.

Deve ser salientado que todas as pacientes em quem foi feita a adrenalectomia tinham sido previamente tratadas pe la rradiação, hormonios androgenicos e estrogenicos, sem resultado. A adrenalectomia forneceu a essas pacientes uma remissão de sintomas não possível, atualmente, por outros meios.

RESUMEN

El tratamiento quirúrgico del cáncer mamario temprano es un procedimiento relativamente sencillo. Los resultados son a menudo alentadores y se presenta una alta supervivencia a los cinco años después de la operación radical (aproximadamente 51 por ciento). Cuando del cáncer recidiva ó metastatiza se dispone de dos métodos principales de tratamiento: (1) irradiación y (2) modificación del estado endócrino del paciente.

La irradicaión es extremadamente valiosa, aun cuando es esencialmente una forma de tratamiento local y paliativo. Mejora los síntomas pero no existe evidencia de que la vida se prolongue. La irradiación durante períodos largos produce a menudo complicaciones tales como (1) tolerancia limitada del tejido normal que circunda a la lesión y (2) destrucción amplia de la médula ósea dando lugar a agranulocitosis y anemia, con aumento de la tendencia al sangrado. Bajo estas circunstancias debe abandonarse la irradiación.

La terapia endócrina del cáncer mamario diseminado es mas general y en casos apropiados puede presentarse regresión del neoplasma en cierto grado. Existen cuatro métodos principales: (1) extirpación de las gonadas, (2) administración de andrógenos, (3) administración de estrógenos, y (4) suprarrenalectomía.

Parece ser que los andrógenos producen los efectos mas favorables sobre las metástasis óseas en os casos de cáncer mamario, beneficiándose aproximadamente un 20 a 30 por ciento de los pacientes. Los efectos colaterales de la administración androgénica son comunes y numerosos, y a menudo el tratamiento tiene que suspenderse. Las complicaciones son hirsutismo, cambio de voz, acné, edema y aumento de la líbido.

La observación de cierto efecto benéfico consecutivo a la terapia con estrógenos en ciertos pacientes con cáncer avanzado de la mama tiene un origen completamente empírico. Los estrógenos deberían ser usados únicamente en mujeres después de la menopausia, obteniéndose os mejores resultados en los pacientes viejos. Los estrógenos son los más eficaces para producir la regresión de las lesiones de tejido blando en el cáncer mamario. Del 20 al 25 por ciento de los pacientes tratados con estrógenos muestran mejoría objetiva. Los efectos colaterales son comunes: edema, sangrado vaginal, náusea y vómito, que a menudo forzan la suspensión del tratamiento.

La suprarrenalectomía bilateral es de reciente desarrollo y fué primeramente ejecutada para el tratamiento del cáncer mamario por Huggins y sus colaboradores, en la Universidad de Chicago en 1951. Los pacientes suprarrenalectomizados pueden ser mantenidos con cortisona. Los resultados de la suprarrenalectomía son más alentadores y en muchas ocasiones espectaculares. El 40 por ciento de un grupo de pacientes no seleccionados fueron beneficiados por dicho procedimiento quirúrgico, siendo el perído postoperatorio de supervivencia máxima de cuarenta meses. El grado de mortalidad después de la suprarrenalectomía es O. La regresión del tumor ocurre en tejido blando y metástasis óseas. El alivio de los síntomas subjetivos es a menudo inmediato y dramático. Cuando responde a la suprar-

renalectomía, el paciente aumenta de peso, recupera su apetito (que ha perdido por mucho tiempo y disfruta de la vida como una persona normal.

Debe señalarse que todos los pacientes en los que se lleva a cabo una suprarrenalectomía han sido tratados previamente por irradiación roentgen y hormonas androgénicas y estrogénicas, sin haberse obtenido resultados satisfactorios. La suprarrenalectomía ha proporcionado una regresión significativa en estos pacientes, que no hubiera sido posible de obtener de otra manera.

ZUSAMMENFASSUNG

Die chirurgische Behandlung des Brustkrebses im frühen Stadium ist ein verhältnismässig einfaches Verfahren. Die Ergebnisse sind oft ermutigend, und die funfjährige Überlebensquote nach radikaler Operation ist hoch (annähernd 51%). Bei Rückfällen des Krebses oder bei Metastasenbildungen stehen grundsätzlich zwei Behandlungsmethoden zur Verfügung, (1) Bestrahlung und (2) Änderung des innersekretorischen Zustandes der Patientin.

Die Bestrahlung ist, auch wenn sie im wesentlichen nur eine örtliche und lindernde Form der Behandlung darstellt, äusserst wertvoll. Sie mildert die Symptome; eine lebensverlängernde Wirkung lässt sich jedoch nicht nachweisen. Langausgedehnte Bestralungen bringen oft unerwünschte Komplikationen mit sich wie z.B. (1) Schädigung des normales Gewebes in der Umgebung des Krankheitsprozesses und (2) Zerstörung des Knochenmarks mit nachfolgender Agranulozytose, Anämie und steigender Blutungstendenz. Unter solchen Umständen muss die Bestrahlung aufgegeben werden.

Die innersekretorische Behandlung des ausgebreiteten Brustkrebses ist mehr allgemeiner Art und führt in geeigneten Fällen zur Rückbildung der Geschwulst in verschiedenem Umfang. Es gibt vier grundsätzliche Methoden der Behandlung: (1) Resektion der Geschlechtsdrüsen, (2) Verabfolgung männlichen Geschlectshormons, (3) Verafolgung weiblichen Geschlechtshormons, und (4) Nebennierenresektion.

Die männlichen Geschlechtshormone haben offendar den günstigsten Einfluss auf Knochenmestastasen in Fällen von Brustkrebs. Etwa 20 bis 30% der so behandelten Kranken werden gebessert. Nebenerscheinungen nach Anwendung männlicher Geschlectshormone sind häufig und vielfältig und führen oft zum Absetzen der Behandlung. Hirsutismus, Stimmwechsel, Akne, Ödeme und Steigerung der Libido sind unangenehme Komplikationen.

Die Beobachtung von Besserungen nach Verabfolgung weiblicher Geschlechtshormone bei gewissen Kranken mit vorgeschrittenem Brustkrebs beruht völlig auf empirischen Eindrücken. Die Anwendung weiblicher Geschlechtshormone sollte auf Frauen jenseits des Klimakteriums beschränkt bleiben; die besten Ergebnisse werden im allgemeinen bei älteren Patientin erzielt. Am wirkungsvollsten ist der Einfluss weiblicher Geschlechtshormone auf die Rückbildung der Weichteilveränderungen beim Brustkrebs. Etwa 20 bis 25% der so behandelten Frauen lassen objektive Besserung erkennen. Nebenerscheinungen sind häufig. Ödeme, vaginale Blutung, Übelkeit und Erbrechen zwingen häufig zum Abbruch der Behandlung.

Die doppelseitige Nebennierenresektion stellt eine neue Entwicklung in der Therapie dar und wurde zur Behandlung des vorgeschrittenen Brustkrebses zuerst von Huggins und seinen Kollegen an der Universität von Chicago im Jahre 1951 ausgeführt. Die ihrer Nebenniere beraubten Kranken können mit fortgesetzten Cortisongaben ohne unerwünschte Nebenerscheinungen am Leben erhalten werden.

Role of the Autonomic Nervous System in Intense Pruritus Ani

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IN a previous communication,[1] we made a preliminary report on the relief of severe intractable pruritus ani presacral neurectomy (sympathectomy of the superior hypogastric plexus). While no report of the performance of this operation for pruritus ani in the United States was found in the literature, it was learned that Cotte,[2] a French gynecologist who introduced presacral neurectomy, had performed the operation on 2 men for pruritus ani. In both cases the condition had proved intractable to all the usual forms of therapy and was so severe that the patients threatened suicide. Both patients were relieved, the follow-up being three years in one case and a matter of weeks in the other. In our own patient, complete and immediate relief of the pruritus was attained by presacral neurectomy, although the follow-up period of seven months is admittedly too short to enable us to evaluate the procedure properly.

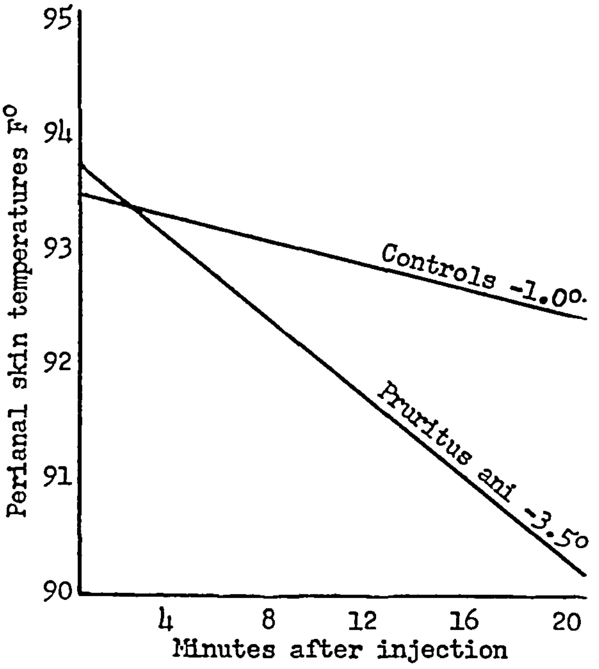
Before performing presacral neurectomy for pruritus ani, we obtained assurance that the operation would result in temporary relief of the patient's itching by a block of the superior hypogastric plexus with metycaine hydrochloride.

The present paper is a further study of block of the superior hypogastric plexus with a local anesthetic (1) with a view of adding to our fundamental knowledge of the autonomic innervation of the anus and (2) in an effort to obtain objective evidence of the effectiveness of the block, in addition to subjective evidence (relief of itching), in cases of pruritus ani, in order that the block might acquire greater diagnostic and prognostic significance.

Technic of Block of the Superior Hypogastric Plexus.—The preganglionic cells of the sympathetic pathways to the sigmoid and rectum lie in the lower thoracic and upper lumbar levels in the intermediolateral column. These cells send their axons out over the lower white rami of the thoracolumbar outflow to the lumbar and preaortic ganglia. Postganglionic neurons originate in the sympathetic trunks, as well as in the preaortic ganglia, to form a plexus descending along the abdominal portion of the aorta. At the level of the inferior mesenteric artery there are two small ganglia, and from them a plexus descends this artery to innervate the sigmoid and rectum. The remainder of the descending sympathetic fibers form the superior hypogastric plexus at the bifurcation of the aorta. This divides into the two hypogastric nerves which run in the hollow of the sacrum to join the inferior hypogastric plexus, the parasympathetic outflow from the second and third sacral segments. Sensory fibers from the posterior root ganglia in the lower thoracic and upper lumbar segments of the cord run directly into the superior hypogastric plexus.

The superior hypogastric pl s

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954
Submitted for publication Oct. 13, 1954.



Block of the superior hypogastric plexus in controls and in patients with pruritus ani.

blocked with a 1.5 per cent solution of metycaine hydrochloride, without epinephrine, by a modification of the technic of Flothow.[3] All blocks were done in an air-conditioned operating room with a relatively constant temperature.

To accomplish block of the superior hypogastric plexus, the patient is placed in the prone position with a pillow under the lower part of the abdomen and the buttocks taped apart. After the perianal area has been exposed to the air for twenty minutes, perianal skin temperatures are taken in each of the four quadrants, at the pigmented border, with a standard thermocouple. After suitable preparation of the skin, a 22-gauge needle 120 mm. long is introduced at a point 7 cm. from the midline, just opposite the spinous process of the fourth lumbar vertebra. The needle is advanced in a medial and caudal direction, at an angle of about 45 degrees, until the upper portion of the body of the fifth lumbar vertebra is encountered. The point of the needle is then advanced over the anterolateral surface of this vertebra for a distance of 1.5 cm., at which point 15 cc. of a 1.5 per cent solution of metycaine hydrochloride is deposited. The needle is then partially withdrawn and redirected toward the body of the fourth lumbar vertebra. After the point of the needle encounters the body of the fourth lumbar vertebra, it is advanced until it slides off the anterior surface of this vertebra, at which point 5 cc. of 1.5 per cent solution of metycaine hydrochloride is deposited. The entire procedure is then repeated on the opposite side of the spine. Twenty minutes after completion of the block, perianal skin temperatures are again taken in the manner previously described.

Results.—Figure 1 shows the average changes in perianal skin temperature after block of the superior hypogastric plexus in patients with pruritus ani and in controls.

In the controls, the average fall in perianal skin temperature after block of the superior hypogastric plexus was 1 F. The minimum fall was 0.5 F. and the maximum fall 1.75 F.

In patients with pruritus ani, the average fall in perianal skin temperature after block of the superior hypogastric plexus was 3.5 F. The minimum fall was 2.75 F. and the maximum fall 5 F.

SUMMARY

A study of block of the superior hypogastric plexus by local anesthetic was inspired by the favorable results of presacral neurectomy in 3 cases of severe intractable pruritus ani, 1 personal case and 2 reported in the literature. It was hoped that in addition to subjective evidence (relief of itching) of the effectiveness of the block, objective evidence of its effectiveness could be obtained, thus giving the block greater diagnostic and prognostic value. The data presented suggest that a relative fall in perianal cutaneous temperature significantly greater than that which

occurs in control patients after block of the superior hypogastric plexus with a local anesthetic is a characteristic of patients with severe pruritus ani. These data also suggest that the sympathetic nervous system is involved in the syndrome of severe pruritus ani, in a manner as yet unexplained.

Further study is indicated and in progress. It is interesting to note, and impossible in the light of current knowledge to explain, the fall in perianal cutaneous temperature after block of the sympathetic pathways, a procedure that commonly causes a rise in this temperature. Except for those presented here, no normal values for perianal cutaneous temperatures are available. We are expanding our studies. Also, perianal cutaneous temperature after block of the sympathetic pathways at various levels in normal persons and in patients with pruritus ani are being studied. In view of the data accumulated thus far, it seems reasonable to expect that such studies will further elucidate the problem.

RIASSUNTO

Il blocco anestetico del plesso ipogastrico superiore è stato tentato in considerazione dei buoni risultati ottenuti con la neurectomia presacrale in 3 casi di prurito anale grave e ribelle (uno personale e due dalla Letteratura). Si sperava di poter ottenere oltre agli effetti soggettivi (scomparsa del prurito) anche segni oggettivi della efficacia del metodo così da confermare il valore diagnostico e prognostico del blocco anestetico. I risultati hanno dimostrato che vi era una caduta della temperatura cutanea perianale in seguito a infiltrazione anestetica del plesso maggiore nei sofferenti di prurito che non nei soggetti di controllo. Questo significa che in tali malati vi è un interessamento del sistema nervoso simpatico. Studi ultariore sono in corso. E' interessante rilevare questa caduta della temperatura cutanea che avviene, inspiegabilmente, dop una manovra che dovrebbe provocarn l'aumento. Si stanno facendo ricerch anche sulle variazioni della temperatur perianale in soggetti normali e con prurito anale dopo infiltrazione a diversi livell delle vie simpatiche e si spera di poter raggiungere una soddisfacente spiegazione del fenomeno.

ZUSAMMENFASSUNG

Durch die günstigen Ergebnisse der Behandlung von drei Fällen mit schwerem unbeeinflussbarem Pruritus ani mittels praesakraler Nervenresektion (ein Fall eigener Beobachtung und zwei aus der Literatur) fühlten sich die Verfasser angeregt, die Resultate einer Blockierung des oberen hypogastrischen Nervenplexus durch örtliche Anaesthesierung zu untersuchen. Sie hofften, ausser dem subjektiven Nachweis einer Wirksamkeit der Blockierung (Nachlass des Juckens) auch einen objektiven Beweis erbringen zu können und dadurch den Wert des Verfahrens in diagnostischer und prognostischer Hinsicht zu erhöhen. Die vorliegenden Angaben deuten an, dass ein relativ starker Abfall der perianalen Hauttemperatur bei Kranken mit schwerem Pruritus ani charakteristisch ist, wenn man ihn mit der Temperatursenkung bei Kontrollfällen nach Blockierung des oberen hypogastrischen Nervenplexus mit örtlicher Betäubung vergleicht. Die Angaben weisen ferner darauf hin, dass das sympathische Nervensystem auf bisher ungeklärte Weise am Symptomenkomplex des schweren Pruritus ani beteiligt ist.

Weitere Untersuchungen sind notwendig und haben bereits begonnen. Es ist interessant und nach dem heutigen Stande unserer Kenntnisse unerklärlich, dass die Blockierung der sympathischen Nervenbahnen, ein Vorgang, der im allgemeinen einen Anstieg der Temperatur hervorruft, zu einem Absinken der perianalen Hauttemperatur führt. Normale Werte für die perianale Hauttemperatur sind ausser denen, die in der vorliegenden Arbeit angegeben sind, nicht erhältlich. Die Untersuchungen der Verfasser werden weiter ausgedehnt und erstrecken sich auch auf die Festsellung perianaler Hauttemperaturen nach Blockierung der sympathischen Nervenbahnen in verschieden noch gelegenen Nervenabschnitten bei Gesunden sowohl als auch bei an Pruritus ani Leidenden. Die bisher gewonnenen Daten berechtigen zu der Annahme, dass diese Untersuchungen zur weiteren Klärung des Problems beitragen werden.

RESUMEN

El estudio del bloqueo del plexo hipogástrico superior por medio de anestésicos locales fué inspirado por los resultados favorables de la neurectomía presacra en tres casos de prurito anal grave, un caso personal y dos comunicados en la literatura. Se espera que además de la evidencia subjetiva de la efectividad del bloqueo (alivio del prurito), la evidencia objetiva puede obtenerse, dando al bloqueo un valor mayor en el diagnóstico y pronóstico. Los datos presentados sugieren que una disminución relativa en la temperatura cutánea perianal mayor que la que se produce en los pacientes testigos después del bloqueo local del plexo hipogástrico superior, es una característica de los pacientes con prurito anal grave. Estos datos sugieren también que el sistema nervioso simpático participa en el síndrome de prurito anal grave, de una manera aún no explicada.

Se encuentra indicada una investigación posterior. Es interesante notar, imposible de explicar a la luz del conocimiento común, la caída de la temperatura cutánea perianal después del bloqueo simpático, ya que este procedimiento generalmente produce un aumento en la temperatura. Excepto de los valores aquí presentados, no existen otros respecto a la temperatura cutánea perianal. Nos tres estamos haciendo estudios más amplios. Asimismo, se está estudiando la temperatura cutánea perianal después de bloqueo simpático a diferentes niveles en personas normales y en pacientes con prurito anal. En vista de los datos acumulados, parece razonable esperar que dichos estudios dilucidarán el problema.

RÉSUMÉ

L'étude du blocage du plexus hypogastrique supérieur par l'anesthésie locale a été inspirée par les résultats favorables de la névrectomie présacrée dans trois cas de prurit, anal grave, dont un cas personnel et deux cas rapportés dans la littérature. Par ce traitement on obtient non seulement une preuve subjective (soulagement des démangeaisons), mais une preuve objective, laquelle donne une grande valeur pour le diagnostic et le pronostic. L'abaissement relatif par exemple, après blocage du plexus hypogastrique, de la température cutanée périanale, chez les malades atteints de prurit anal grave, a une signification pathognomonique. L'état du système nerveux sympathique n'est donc pas étranger au syndrome du prurit anal grave.

En conséquence, il convient de poursuivre cette étude, car habituellement le blocage des voies sympathiques fait monter la température périanale. Cette température cutanée périanale après blocage des voies sympathiques sera contrôlée à différents niveaux aussi bien chez des personnes normales que chez celles atteintes de prurit anal.

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Treatment of Metastatic Brain Tumors

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I HAVE always held and advocated the principle that the best treatment for a brain tumor is its surgical removal. Up to the time of writing I have seen no reason to change that point of view. Though one may not accomplish a cure, giving a patient temporary relief has always seemed to me a worthwhile procedure.

There are brain tumors, the treatment of which is discouraging, notably the glioblastomas, yet every once in a while a case is reported in which the patient has survived far longer than the time expected.

The treatment of metastatic brain tumors is even more discouraging, from the point of view of cure, than that of the glioblastomas, but even with these it sometimes happens, as will be shown later, that a patient may survive for a considerable time.

Several questions therefore, must be considered in deciding what to do with these patients:

First: Is it possible to determine definitely that a tumor is metastatic before subjecting the patient to an operation?

Second: How accurately is it possible to determine the type of pathologic process from a study of the history, the results of physical examination and the use of various special tests?

Third: If one is able to establish definitely the fact that one is dealing with a metastatic tumor, how should one proceed?

My experience with metastatic tumors is based on a study of 102 cases in a series of 1681 verified brain tumors. These 102 cases were observed and the patients operated upon in my service between 1911 and 1948. A few of them were patients of Dr. Furlow, my former partner, who has permitted me to include them in this survey.

It has been claimed that certain symptoms, such as extremely intense headache and mental confusion, are indicative of a metastatic lesion. To this view I cannot subscribe at all. Though a metastatic lesion may be suspected, there are no symptoms or signs that are pathognomonic of metastatic malignant change.

The symptoms of a metastic tumor are, as a rule, identical with those of any other brain tumor and vary in their location and rapidity of growth just as other tumors do. While it is true that, in a certain number of cases, the multiplicity of lesions may present a confusing clinical picture and arouse the suspicion of metastatic malignancy, suspicion is not proof! This is an important consideration in assessing a given case and deciding upon the course of treatment to be followed. In some instances the symptoms come on insidiously and are those of increased intracranial pressure, while at other times they come very suddenly, like a bolt out of the blue.

A few brief h

Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

of the various pictures that may be encountered.

In 1925 I saw a man who had been in perfect health until suddenly, while rowing in a shell one day, he had a focal convulsion which lasted a short time. As that was before ventriculographic procedures were used extensively, I operated upon him on the evidence of his convulsive seizure alone and found no lesion—as frequently happened in the days before air injections were used. His convulsions continued and headaches developed. Six months later he was operated on by Dr. Cushing, who found at the site of my previous operation a huge necrotic tumor that proved to be a metastatic carcinoma; and, on further examination after operation, a large, symptomless primary tumor of the lung, entirely unsuspected, was found. At that time surgeons had not learned to take routine thoracic films of all patients with brain tumor. Today this has become a regular procedure, because it is known that bronchogenic carcinomas frequently cause brain metastases. The actual percentage is difficult to determine, because many patients (50 per cent) in my series, died at home, and no autopsy was performed.

In contrast with the case just described, I operated upon a patient in 1927 and removed an encapsulated tumor from the temporal lobe. The patient made a perfectly uneventful recovery and remained well for thirteen years. At the end of this time she was seen by another surgeon and was operated upon for a large tumor of the liver, which was observed to be histologically identical with the one removed thirteen years earlier. The patient died, and at autopsy there were metastases in the lungs and abdomen, but no evidence whatever of any tumor in the cranial cavity, where the primary tumor had been located.

Another rather extraordinary case was one in which I operated first in 1933, removing a tumor as large as a lemon from the temporal lobe. Ten months later the patient returned with signs of a recurrence and was reoperated upon. At this time the tumor was lying partly in the lateral ventricle. It was malignant, and the patient was given high voltage roentgen therapy. He then moved to Cleveland, where Dr. Gardner saw him a year later and ordered further roentgen treatment. A year after this he appeared in Boston, where Dr. Horrax reoperated upon him for a recurrence and removed another huge tumor, apparently completely, and resected part of the longitudinal sinus. Dr. Eisenhardt studied both my sections and those of Dr. Horrax and pronounced them carcinoma of the choroid plexus. This patient died of a recurrence in August 1937, four and one-half years after the first operation. After a recent restudy of the sections, Dr. Eisenhardt considers the tumor a malignant ependymoma, so perhaps it should not be classed as a metastatic tumor; however, the case illustrates the fact that life may be prolonged by repeated operations.

A fourth patient had a large tumor removed from his cortex. He was given no roentgen treatment but was perfectly well, apparently, when seen four years later. The diagnosis of the tumor specimen was carcinoma simplex.

Data on 102 Metastatic Malignant Growths (6 Per Cent) in a Series of 1,681 Verified Tumors

Type	*Number*	*Comment*
Sarcoma	24	5 patients survived 1 to 5 years, 1 patient 13 years
Carcinoma	70	1 patient (with bronchogenic tumor) survived 15 months; 9 (primary tumor site unknown) survived 13 months to 4 years
Melanoma	3	
Hypernephroma	4	1 patient living over 1 year

The occurrence of metastatic nodules in the brain, sometimes long after a primary growth has been removed, has been observed on a number of occasions. I removed a single hypernephromatous nodule from the brain in 2 patients seven years after each of them had had a kidney removed because of a hypernephroma. Single metastatic nodules seem to occur more frequently with hypernephromas than with any other type of malignant tumor. A number of cases in which this occurred have been reported in the literature. Most recently, Stortebecker has reported a number of such cases from Olivecrona's clinic. It is rather surprising that, in Olivecrona's statistics, hypernephromatous tumors were far more common than in my series or in those of others. In his series 18 per cent were hypernephromas, while in my series only 2 per cent were of this type. This discrepancy, however, might be accounted for, in part at least, had more autopsies been performed on the large number of patients who died at home.

Until recently, the attitude about treating patients with metastatic malignant tumors has been very conservative, because they were considered absolutely hopeless. This was the view expressed by Cushing, Bailey and Grant. Oldberg, however, in 1933, took a different attitude. He pointed out that these patients might be given temporary relief and be kept comfortable for a considerable time, and that furthermore, since it was impossible to make a positive preoperative diagnosis, all patients with symptoms of an intracranial tumor, unless *in extremis,* should be given the benefit of an exploratory procedure. In 1948, Livingston, Horrax and Sachs Jr., reviewed their experience with 51 metastatic tumors and observed that the period of survival was longer for patients without papilledema. They did not, however, consider specifically the advisability of operating upon metastatic malignant tumors.

As a rule, patients with metastatic tumors live less than a year, but occasionally they live longer. It is not clear from a study of my cases to what extent roentgen therapy prolonged their lives. Only a few were given very large doses. From a study of my cases of glioblastomas, which I reported about a year ago, I am convinced that, to have any effect, the dosage must be much larger than is ordinarily given. Radon seeds, applied as described in the aforementioned report, may be more effective than roentgen therapy in cases of metastatic carcinoma, as was observed in the treatment of glioblastomas.

Whether, in an operation for a metastatic tumor, a decompression should be made a part of the routine procedure, or whether the dura should be completely closed, is a moot question. In my cases I always left a decompression with the idea of making the patient more comfortable when he had his recurrence, but the idea of closing the dura, so that the patient will die more quickly when the recurrence comes, has its advocates. No doubt there is some justification for this point of view, but the prolongation of life in comfort, or comparative comfort, and giving the patient time to arrange his affairs for his family, seems to me the higher aim.

In the past few years various methods have been introduced that tend to prolong the lives of patients with cancer. The most effective of these seem to be the use of radon seeds as aforementioned, or a cobalt bomb, as advocated by the late Sir Hugh Cairns and carried out for him by Stanford Cade. Most recently, the extraordinary results following complete hypophysectomy in several cases of metastatic brain tumor, as first suggested and carried out by Olivecrona, give great promise. This work is reported in articles by Luft and Olivecrona and by Stortebecker. In attempting this procedure, however, it should be kept in mind, as Olivecrona has emphasized, that a complete hypophysectomy is a much more formidable undertaking than the usual pituitary operation, because in this procedure the entire gland must be removed.

It is, of course, entirely too early to appraise the permanent value of this latest operation, but it holds out new hope for the cancer patient, and the reports will be followed with the keenest interest. It would seem, therefore, that since the outlook for patients with metastatic malignant tumors is not so gloomy as it used to be, there is ample justification in continuing attempts to prolong their lives and ultimately, perhaps, to effect a cure.

ZUSAMMENFASSUNG

In den letzten Jahren sind verschiedene neue Verfahren vorgeschlagen worden, die darauf hinzielen, das Leben von Kranken mit Krebsmetastasen zu varlängern. Die wirksamsten unter diesen sind die von dem verstorbenen Sir Hugh Cairns empfohlenen und später von Stanford Cade ausgeführten Einpflanzungen von Radiumkapseln oder die Anwendung einer Kobaltbombe. Neuerdings scheinen die aussergewöhnlichen Erfolge der totalen Hypophysenresektion, die zuerst von Olivecrona vorgeschlagen und ausgeführt wurde, vielversprechend zu sein. Eine Arbeit von Lufts und Olivecrona aus seiner Klinik berichtet überraschend gute Resultate. Wer die Ausführung dieser Methode unternimmt, darf allerdings, wie Olivecrona hervorhebt, nicht vergessen, dass die totale Resektion der Hypophyse, da es sich um eine Entfernung der gesamten Drüse handelt, einen viel gewaltigeren Eingriff als eine gewöhnliche Hypophysenoperation darstellt.

Es ist natürlich viel zu früh, den endgultigen Wert dieses neuesten Verwahrens abzuschätzen. Immerhin enthält es für den am Krebs leidenden Kranken einen neuen Hoffnungsstrahl, und die weiteren Berichte werden daher mit grösstem Interesse erwartet.

Da die Aussichten für Kranke mit Krebsmetastasen nicht mehr ganz so traurig sind wie früher, scheinen Versuche, ihr Leben durch chirurgische Massnahmen zu verlängern und angenehmer zu gestalten, durchaus gerechtfertigt zu sein.

RÉSUMÉ

Ces dernières années, des méthodes variées et nouvelles ont été introduites dans le but de prolonger la vie des patients atteints de métastases cancéreuses. Parmi celles-ci les plus efficaces sont l'utilisation d'aiguilles de radon ou une sonde de cobalt, méthodes défendues par fue Sir Hugh Cairns et exécutées par Stanford Cads. Plus récemment les résultats extraordinaires obtenus à la suite d'hypophysectomie totale, méthode suggérée et pratiquée par Olivecrona, sont très prometteurs. Un travail fait dans sa clinique, signé Lufts et Olivecrona, rapportent des résultats surprenants. En essayant ce procédé, toutefois, il faut faire attention, comme Olivecrona l'a fait remarquer, qu'une hypophysectomie totale est une opération beaucoup plus grave que l'opération habituelle d'une tumeur hypophysaire, car la glande entière est extirpée.

Il est naturellement encore trop tôt pour évaluer la valeur réelle de ce dernier procédé, mais il offre un nouvel espoir aux malades atteints de cancer; les observations seront suivies avec le plus grand intérêt.

Il semblerait donc que, puisque l'avenir de ces patients atteints de métastases cancéreuses n'est pas si sombre qu'on le pensait jusqu'à présent, cette intervention chirurgicale se justifie amplement étant

donné qu'elle tente de prolongar la vie de ces malades en la leur rendant plus supportable.

RIASSUNTO

Molti metodi sono stati proposti negli ultimi tempi nel tentativo di promungare la vita ai pazienti con metastasi neoplastiche; fra questi i più efficaci si sono dimostrati gli aghi di radio e le bombe al cobalto. Recentemente gli eccellenti risultati conseguiti con l'ipofisectomia totale secondo il metodi di Olivecrona hanno aperto la strada a grandi speranze. Questi risultati sono stati comunicati da Lufts e Olivecrona in un recente articolo, in cui viene anche messo in rilievo la grande difficoltà dell'intervento che consiste nella asportazione completa dell'ipofisi. E' troppo presto, naturalmente, per farsi un'opinione sull'efficacia reale del metodo, ma i primi risultati sono promettenti e meritano di essere seguiti con interesse. Si può fin d'ora asserire che ogni tentativo diretto a prolungare la vita dei malati con metastasi neoplastiche è pienamente giustificato.

RESUMEN

En los últimos años se han introducido diversos métodos nuevos que tienden a prolongar la vida de los pacientes con metástasis cancerosas. De estos el más efectivo es el uso de semillas de radón o una bomba de cobalto, como fué preconizado por Sir Hugh Cairns y llevado a cabo por él y Stanford Cade. Recentemente, los extraordinarios resultados de la hipofisectomía, como fué sugerida y llevada a cabo por Olivecrona, son prometedores. Un artículo de su clínica por Lufts y Olivecrona refiere resultados favorables sorprendentes. Sin embargo para intentarse este procedimiento, debe tenerse presente como ha señalado Olivecrona, que una hipofisectomía completa es un procedimiento más formidable que la operación hipofisiaria común, ya que en esta operación se extirpa toda la glándula.

Por supuesto que es muy temprano para apreciar el valor permanente de este último procedimiento. Sin embargo ofrece una neuva esperanza para el paciente canceroso y las comunicaciones en este sentido serán seguidas con gran interés. Parece ser por consiguiente que la perspectiva para los pacientes con cáncer metastásico no es tan mala como solía ser y existe justificación plena para interntar el hacer a dicho paciente una vida más confortable y prolongada por medio de la cirugía.

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Salpingostomy for Sterility

A New Original Technic

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RESULTS of salpingostomy procedures have been unfavorably compared with those of tubal implantation. Combined surgical methods employed in treating a patient who desires correction of her infertile state can only serve to make evaluation difficult. In addition to the pathologic condition, often the original reason for operation, coincidental salpingostomy may be considered a failure, although actually such cases should be separately listed.

Surveys of plastic tubal operations by Greenhill, von Graff, and Rutherford, Lamborn and Banks, have indicated that salpingostomies are followed by less success than are uterotubal implantation procedures. Such surveys apparently have failed to consider that salpingostomies are performed on tubes closed by disease, while implantations are often done on healthy, unchanged tubes that have been surgically interrupted. Many procedures reported as salpingostomies are done in cases in which the salpingostomy was coincidentally performed after treatment of uterine or ovarian disease, which frequently was a factor in the patient's inability to conceive. Such cases should be separately considered, so as to permit proper evaluation of the success of tubal operations.

The pathology in conditions revealed at laparotomy dictate the nature of the combined operations to be performed. These may include salpingolysis to free peritubal adhesions, opening of an occluded fimbriated ostium, and partial resection of distal portions of the tube with eversion of the mucosa (using the cuff methods of Sovak or the so-called circumcision operation of Bonney). Among these procedures are the treatment of associated pathology such as myomectomy, conservative operations for endometriosis, or salpingostomy by one method may be performed on one side and a uterotubal implant on the other.

It is difficult to evaluate the relative merits of various technics. Uterotubal implantation in a patient previously made sterile by operation (Pomeroy or Madlener method), when the pelvis shows no pathologic change, obviously can be expected to yield a higher percentage of success. In such cases the cause of obstruction is always the sole source of oviduct failure.

The conclusion has been drawn that preservation of the maximum length of oviduct is of the utmost importance. That conclusion, however, probably was based upon the good results obtained when minimal alterations were required, such as freeing of peritubal adhesions and simple opening of the lightly closed fimbria. In order to preserve the length of damaged tubes by preventing their closure after operation, methods using allantoic membrane, polyethylene tubing and strands of catgut have been variously and ingeniously devised and tried, but with doubtful success. Other foreign body methods have been used with varying results, including the use of bone wax to inhibit postopera-

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Submitted for publication Nov. 1, 1954.

tive closure and the use of a polyethelyne funnel at the fimbriated end, which involves subsequent surgical removal of the funnel. Resorting to such methods appears to be based on the time-honored theory that the fertilized ovum must have adequate time for maturation while passing from the fimbriated end of the tube through a required length of oviduct before it can properly implant itself in the uterus.

The following case report, however, indicates that maturation of the ovum during passage through a normal length of tube is not essential. The importance of preserving any diseased portion of a fallopian tube became highly questionable to me after deliberating about the fertility of this patient, whose only remaining segment of fallopian tube was 5 or 6 mm. in length.

REPORT OF CASE

On Nov. 20, 1936, Mrs. R. S., aged 33, gravida 3, para 1, was admitted to St. Mary's Hospital with the preoperative diagnosis of ovarian tumor and rectocystocele. Her pertinent history included one full term delivery and two spontaneous abortions, lichen planus, a lifelong tendency to obesity, and an operation following pelvic inflammatory disease in 1926, in which adhesions were said to have been divided and a suspension performed for a retroverted uterus.

Operation revealed the uterus to be normal in size, position and contour; the right ovary contained a 5 cm. mass, which pitted easily and proved to be a dermoid tumor. The diseased right tube and ovary were completely removed and the cornual wound peritonealized with the round ligament. The left ovary was normal, but the left tube was tortuous and thickened. Efforts to probe the lumen of the tube were fruitless; therefore the most diseased portion was resected. A proximal stump 6 mm. long was left in place. Several fine catgut sutures were used before hemostasis of the new ostium was assured. The lumen appeared to be 4 mm. in diameter after the narrowing caused by the introduction of many marginal hemostatic sutures. The abdomen was closed in layers and an anterior and posterior colporrhaphy performed. The patient had a satisfactory convalescence. On Dec. 7, 1939, after a normal full term pregnancy, she was delivered of a child. Later she became pregnant twice but had incomplete abortions on Oct. 2, 1941 and Dec. 7, 1942.

I have used the Gomco circumcision clamp in 12 operations since 1943. Three of these were followed by successful pregnancies, resulting in 5 live babies. In all 3 instances the tubes were markedly altered by salpingitis and the tubes shortened as much as possible in order to remove pathologic oviduct passages.

The Gomco clamp can be applied to salvage a tube after the removal of an ampullary tubal pregnancy. A moderate amount of bleeding occurs from within the endosalpinx but not from the crushed margin left by the amputation.

Technic of Operation.—After the peritoneal cavity has been opened (Fig. 1*A*) the uterus is mobilized by freeing any adhesions posteriorly, and the cul-de-sac is inspected for evidence of endometriosis. The ovaries and tubes are inspected and freed by dividing the adhesions that distort the tube. Small incisions of additional bands are made, care being exercised to avoid injury to the blood vessels of the mesosalpinx. The result is a straightened but thickened and dilated club-shaped tube with a closed fimbriated end. The tube may appear quite narrow at the isthmic portion and often for most of its length.

Figure 1*B* shows a tube held by Kelly clamps to facilitate location of the lumen. Palpation of the tube at this time may reveal the presence or absence of firm nodules or firm adhesions.

Figure 1*C* shows a tube the canal of which has been located and a round-tipped cannula introduced. Aspiration by means of a luer syringe often yields clear fluid, as in cases of hydrosalpinx, and may reveal obstruction, which gives way to pressure of the rounded tip of the probing cannula. Further aspiration may then be followed by injection of air or saline solution until there is evidence of free passage into the uterus.

Figure 2*A* illustrates the average conditions that prevail when such a tube is prepared for incision of the mesosalpinx. This incision extends the full length of that portion of the tube which will admit the entrance of the bell of the Gomco clamp, as indicated in Figure 2*B*, in which a holding suture is being placed. No part of the tube has yet been amputated, and the bell has been forced as far as possible into the tube. The holding suture is most effectively placed by the use of a needle. After the suture has been securely tied, the operation often is facilitated by additional small incisions of the mesosalpinx and removal of a portion of the tube which is to be amputated.

Figure 2*C* illustrates the clamp in place, where it can be tightly applied, as in circumcision for amputating the prepuce in the male. It is allowed to remain for ten minutes. A scalpel is then used to incise the site of compression, leaving a circular ostium, which is free from bleeding and results in agglutination of the endosalpinx to the serosa. Usually the two tubes are similarly treated.

After removal of the clamp, there is a minimal rim of crushed tissue about 1 mm. in diameter. This ostium has been stretched by the bell and is therefore less likely to contract than if the endosalpinx and the serosa had been approximated by sutures.

SUMMARY

Hitherto reported surveys have indicated a major incidence of failure in tubal plastic operations in which maximum length of tube has been salvaged, especially as compared with uterotubal implantation. Salpingostomy technics, by their very nature, indicate the presence of an abnormal structure. Uterotubal transplants are indicated in those cases in which the salvageable tube is normal, being preceded by no major pathologic condition but by a surgically produced interruption.

It is recommended that the diseased oviduct be sacrificed, leaving only the narow, more healthy tube structure for the passage of the ovum and thus minimizing the danger of arresting a fertilized ovum which would result in tubal pregnancy. Postoperative morbidity would be reduced for the same reason.

A new method of amputating the tube, employing the Gomco clamp, is described. Its advantages are the elimination of the need of hemostatic sutures in forming the ostium; it provides a guide in selecting the amount of pathologic thickened tube to be removed and results in a stretched surgical ostium with margins of serosa and endosalpinx agglutinated by pressure. This simple method permits the salvage of more oviducts in the presence of pathologic conditions, including tubal pregnancy.

It has the further advantage of reducing the incidence of postoperative closure without the use of foreign substances to maintain patency.

Proper consideration of the presence or absence of pelvic disease should result in a reclassification in future surveys. Such surveys should classify separately, patients with coincidental pathologic conditions, viz., endometriosis, uterine fibroids and other pelvic changes from the simpler hydrosalpinx and surgically produced sterility.

Salpingostomy employing the Gomco clamp, by virtue of which the healthier, narrower portion of the patent oviduct is preserved will assure more pregnancies and fewer postoperative closures.

RÉSUMÉ

Les observations rapportées jusqu'à ce jour indiquent une grande fréquence d'échecs dans les opérations plastiques de

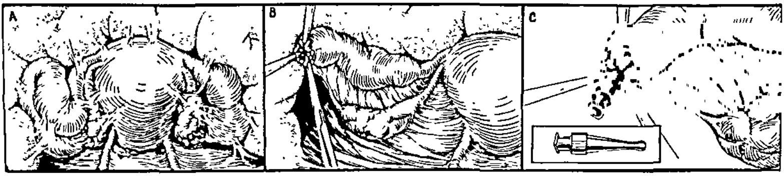

Fig. 1.—Operative technic (see text)

la trompe de Fallope dans lesquelles la longueur maximum de la trompe a été épargnée, surtout comparativement à l'implantation utéro-tubale. Les techniques de salpingostomie, de par leur nature même, indiquent la présence d'une structure anormale. La transplantation utérotubale est indiquée dans les cas où la portion de trompe pouvant être épargnée est normale, si elle n'est précédée d'aucun état pathologique sérieux, et que l'interruption a été provoquée chirurgicalement.

Il est recommandé de sacrifier la trompe de Fallope pathologique afin de ne laisser qu'une extrémité saine pour le passage de l'ovule, diminuant ainsi le danger de l'arrêt de fertilisation de l'ovule et évitant une grossesse tubaire. La mortalité post-opératoire est abaissée pour la même raison.

Une nouvelle métode d'amputation de la trompe avec utilisation de la pince de Gomco est décrite. Elle a pour avantages de rendre superflues les sutures hémostatiques. Cette méthode simple permet d'épargner davantages de trompes dans les cas pathologiques, y compris la grossesse tubaire.

Cette méthode permet également de réduire la fréquence de la rétraction spontanée post-opératoire, sans qu'il soit nécessaire de recourir à aucune substance spéciale pour maintenir la trompe ouverte.

L'examen de la présence ou de l'absence d'une affection pelvienne devrait avoir pour résultat une reclassification des *études à ce sujet. Il faudrait classer* séparément les malades atteintes d'affections concomitantes telles qu'endométriose, fibromes utérins et autres modifications pelviennes, depuis le imple hydrosalpinx et la stérilité provoquée chirurgicalement.

La salpingostomie à l'aide de la pince de Gomco, qui permet de préserver la portion la plus étroite et la plus saine de l'ostium, assure plus de grossesses et moins de rétractions post-opératoires.

ZUSAMMENFASSUNG

Eine Uebersicht der bisher vorliegenden Berichte ergibt haeufige Fehlresultate plastischer Operationen am Eileiter, wo ein moeglichst grosses Stueck der Tube erhalten wurde, besonders wenn man die Resultate mit denen der Einpflanzung des

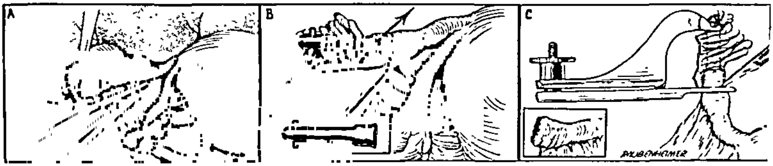

Fig. 2.—Operative technic (see text)

Eileiters in den Uterus vergleicht. Die Verfahren der Salpingostomie weisen ihrem Wesen nach darauf hin, dass ein abnormes Gebilde vorlag. Einpflanzungen der Tube in den Uterus kommen in den Faellen in Frage, wo der erhaltungsfaehige Eileiter normal ist und ausser der chirurgisch erfolgten Durchtrennung keine Schaedigung aufweist.

Es wird empfohlen, den erkrankten Eileiter zu opfern mit dem Ziel, nur den engen gesuenderen Eileiter fuer den Durchgang des Eies uebrigzulassen und auf diese Weise die Gefahr der Blockierung eines befruchteten Eies, die zur Tubenschwangerschaft fuehren wuerde, zu verringern. Auf diese Weise wuerde sich auch die Morbiditaet nach der Operation herabsetzen lassen.

Es wird eine neue Methode der Amputation des Eileiters unter Verwendung der Gomcoschen Klemme beschrieben. Ihre Vorteil liegen in der Ausschaltung der Notwendigkeit blutstillender Naehte bei der Bildung des Ostiums; das Verfahren bietet Hinweise fuer die Auswahl der Laenge des zu entfernenden krankhaft verdickten Tubenabschnitts und fuehrt zur Schaffung eines gestreckten chirurgischen Ostiums, dessen seroese und epitheliale Raender durch Druck verklebt werden. Diese einfache Methode gestattet eine haeufigere Erhaltung von Eileitern, die krankhafte Veraenderungen - einschliesslich der Tubenschwangerschaft-aufweisen.

Ein weiterer Vorteil liegt in der Herabsetzung der Haeufigkeit postoperativer Tubenverschluesse, ohne dass koerperfremdes Material zur Erhaltung der Durchlaessigkeit angewendet werden muss.

Eine angemessene Beruecksichtigung der Frage ob eine Beckenerkrankung vorliegt oder nicht, sollte bei Uebersichtsstudien in der Zukunft zu einer neuen Klassifizierung fuehren. In solchen Arbeiten sollten Patientinnen mit gleichzeitig bestehenden Krankheitsveraenderungen wie Endometriose, Uterusmyomen und anderen Erkrankungen des kleinen Beckens in eine andere Klasse eingereiht werden als die mit einer einfacheren Hydrosalpinx und mit chirurgisch hervorgerufener Sterilitaet.

Die mit der Gomcoklemme ausgefuehrte Salpingostomie, die die Erhaltung des gesuenderen engeren Abschnittes des offenen Eileiters gestattet, wird eine groessere Anzahl von Schwangerschaften sichern und zum selteneren Auftreten von postoperativen Verschluessen fuehren.

RESUMEN

Las comunicaciones indican mayor incidencia de fracasos en las operaciones plásticas de la trompa en las cuales se ha conservado la longitud máxima del tubo, especialmente comparadas con la implantación túbouterina. Las técnicas de salpingostomía indican la presencia de una estructura anómala. Los trasplantes tubouterinos están indicados en aquellos casos en los cuales la trompa utilizable es normal, no habiendo sido afectada por procesos patológicos considerables sino por la interrupción quirúrgica.

Se recomienda que la trompa enferma se sacrifique con el interés de dejar únicamente la estructura tubular delgada sana para el paso del óvulo, disminuyendo así la detención de un huevo fertilizado que produciría un embarazo tubario. Por esta razón debe disminuírse la morbilidad postoperatoria.

Se describe un nuevo método de amputación de la trompa empleando la pinza de Gomco, que tiene la ventaja de eliminar la necesidad de suturas hemostáticas para formar el ostium; asimismo proporciona una guía para seleccionar la cantidad de tubo engrosada patológicamente que ha de ser extirpado, que resulta en un ostium quirúrgico cuyos márgenes de serosa y

endosálpinx son aglutinados por la presión. Este método simple permite la conservación de más oviductos en presencia de procesos patológicos, incluyendo embarazo tubario.

Tiene la ventaja de reducir la incidencia de cierre postoperatorio sin el uso de substancias extrañas que mantengan la permeabilidad. La consideración apropiada de la presencia o ausencia de padecimientos pélvicos resultaría en una reclasificación. Deben clasificarse separadamente los pacientes con procesos patológicos como endometriosis, fibromas uterinos y otros procesos pélvicos del hidrosálpinx simple y la esterilidad producida quirúrgicamente.

La salpingostomía empleando la pinza de Gomco, en virtud de conservar la porción de oviducto permeable más sana y delgada asegura más embarazos y menos cierres postoperatorios.

SUMARIO

As revisões da literatura feitas até esta data têm evidenciado as falhas das operações plásticas sôbre a trompa, em que se procura preservar uma extensão máxima da mesma, especialmente em comparação com as implantações útero-tubáricas. As técnicas de salpingostomia, por sua própria natureza, indicam a presença de uma estrutura anormal. Os transplantes útero-tubáricos são indicados nos casos em que a trompa a ser conservada é normal, não tendo havida anteriormente qualquer afecção patológica de maior significação, mas sim sua secção produzida cirùrgicamente.

Recomenda-se que a trompa afetada seja sacrificada, com o objetivo de deixar-se apenas a estrutura tubular estreita e mais sã para a passagem do ovum, diminuindo-se assim o perigo da parada de um óvulo fecundado, o que resultaria numa prenhez tubárica. Pela mesma razão seria diminuida a morbidade pósoperatória.

Foi descrito um novo método para a amputação da trompa, utilizando-se a pinça Gomco. Suas vantagens são a eliminação da necessidade de suturas hemostáticas para formar-se o ostium; fornece uma orientação para determinar a extensão de trompa espessada patológica a ser extirpada, resultando numa abertura cirúrgica distendida, com bordas de serosa e endosalpinge acoladas por pressão. Este método simples permite a conservação de maior número de trompas na presença de afecções patológicas, inclusive prenhez tubarica.

Apresenta ainda a vantagem de reduzir a incidência da obliteração pós-operatória, sem o uso de substâncias extranhas para manter a permeabilidade.

A consideração adequada da presença ou ausência de afecções pélvicas deve resultar numa reclassificação nas revisões futuras. As revisões devem classificar separadamente as pacientes com afecções patológicas com incidentes, por exemplo endometriose, fibróides uterinos e outras afecções pélvicas da hidrosalpinx mais simples e esterilidade produzida cirùrgicamente.

A salpingostomia por meio da pinça Gomco, pela qual a porção mais sã e estreita da trompa é conservada, garantirá maior número de gravidezes, e menor número de obliterações pós-operatórias.

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The prevention of free inquiry is unavoidable so long as the purpose of education is to produce belief rather than thought, to compel the young to hold positive opinions on doubtful matters rather than to let them see the doubtfulness and be encouraged to independence of mind. Education ought to foster the wish for truth, not the conviction that some particular creed is the truth. But it is creeds that hold men together in fighting organizations—churches, States, political parties. It is intensity of belief in a creed that produces efficiency in fighting; victory comes to those who feel the strongest certainty about matters on which doubt is the only rational attitude. To produce this intensity of belief and this efficiency in fighting, the child's nature is warped and its free outlook is cramped by cultivating inhibitions as a check to the growth of new ideas. In those whose minds are not very active, the result is the omnipotence of prejudice; while the few whose thought cannot be wholly killed become cynical, intellectually hopeless, destructively critical, able to make all that is living seem foolish, unable to supply themselves the creative impulses which they destroy in others.

—*Russell*

Jejunovesical Fistula Secondary to Carcinoma of Cervix Uteri

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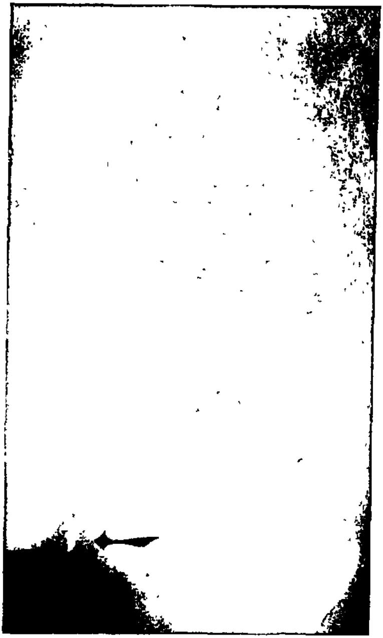
IT is not a usual experience to encounter a female patient who passes partly digested food through the urethra. This situation confronted us recently, and our problem is presented here.

REPORT OF CASE

Mrs. D. P., a 29-year-old housewife, was admitted to a hospital in New York City in September 1952. At that time she complained of intermittent vaginal bleeding of three months' duration associated with loss of about 20 pounds (9.1 Kg.) in weight. She was extremely pale and had the appearance of a chronically ill patient. The only significant past history was that of an abortion in May 1952.

On Sept. 12 the patient was subjected to a total hysterectomy. The pathologic diagnosis was squamous cell carcinoma of the cervix and adenomyosis uteri. After this operation she was given massive doses of irradiation to the pelvic area. In July 1953 she had some urinary distress. Roentgen studies demonstrated an obstruction to the right ureter and hydronephrosis secondary to scar tissue in the pelvis. A right nephrectomy was performed for hydroureter and hydronephrosis on July 9, 1953. In spite of all this treatment the patient did not regain her health. She was taken to a "cancer specialist" who put her on a vegetable juice diet, which was supposed to "cure" cancer. During the Christmas holidays of 1953, liquid burst out of the right nephrectomy incision. Soon thereafter the food (vegetable juice) taken at mealtime would find its exit through the nephrectomy wound one or two hours later. Several weeks after the initial passage of undigested food through the right side, the same thing occurred vaginally, i. e., undigested food "dripped out" of the urethra two or three hours after eating.

In February 1954 the patient was seen by us for the first time as a hospital patient. She



Roentgenogram taken after a barium swallow, showing a collection of barium in the pelvis. The barium-filled area is saucer-shaped, which indicates that it is in the urinary bladder. Arrows indicate barium passing out through the urethra into the vaginal orifice.

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Submitted for publication Jan. 3, 1956.

was small of stature and clinically appeared chronically ill. She was emaciated but mentally alert and fully cognizant of the nature of her illness. She wished urgently to have something done to eliminate the drainage of food from the right side and through the vagina. She was given multiple blood transfusions, vitamins, etc., as a preoperative regimen.

The significant observations on physical examination were a fistulous tract through the right nephrectomy scar, from which emanated the vegetable juice that the patient's husband prepared at home and brought to the hospital. This same vegetable juice was collected by the nurse as it exited through the urethra. Both fluids (from the right scar and the urethra) were compared with the juice taken by mouth. They were identical.

A moderate amount of barium was administered by mouth. It did not come out of the nephrectomy scar, but barium found its way into the urinary bladder and out through the urethra into the vagina (see illustration).

Exploratory laparotomy was performed on February 15. When the abdomen was entered, multiple loops of small intestine (jejunum) were matted together and densely adherent to the pelvis and adjacent structures. When this matted jejunum was liberated it was found to have acted as a plug over the inferior remains (about one-fourth) of the urinary bladder. The jejunum was perforated at the site where it covered the urinary bladder and assumed the rôle of a cover to the almost entirely destroyed bladder (similar to a cover for a teapot). The presence of the jejunum over the bladder prevented the spilling of urine into the peritoneal cavity, even as it supplied an exit for the jejunal contents to pass into the bladder and out by the vagina through the urethra.

In addition, a second loop of jejunum was adherent to the right side of the abdominal wall, and a segment had perforated through the scar from which emanated the aforementioned undigested vegetable juice. Grayish white metastatic areas were noted in the jejunal loops adherent to the urinary bladder and the nephrectomy incision. Jejunal segments were resected in both areas (20 cm. in the pelvic area and 20 cm. at the nephrectomy scar site) and an end-to-end anastomosis performed. The remaining ureter (left) was transplanted and imbedded into the sigmoid. A pelvic eventration was contemplated but was not performed, because the patient's general condition (as reported by the anesthetist) was poor. The patient recovered from the surgical procedure but died on the sixth postoperative day.

COMMENT

From this case it is believed that the uterine carcinoma spread into the urinary bladder, causing all the destruction observed at operation. The destruction of the bladder could possibly be attributed to the irradiation administered. This idea was promulgated in 1935 by the distinguished surgeon Mikulicz-Radecki.[1] In that year he reported 2 cases of vesical injury in 375 patients treated by irradiation for carcinoma of the cervix. He stated that irradiation can produce ulceration in the bladder, which results in the shedding of small areas of mucosa and muscle (Stoeckel's cystitis dissecans gangrenosa actinogenetica). However, in our opinion, destruction of the bladder in our case was not due to irradiation but rather to the spread of the neoplasm, which destroyed the bladder and invaded the small bowel.

A few words may be said about this "new" so-called cancer diet. This was the third patient who came to us after having been treated with vegetable juice. All three died.

SUMMARY

The case of a 29-year-old patient with carcinoma of the cervix uteri is reported. After hysterectomy and irradiation a chain of complications occurred. These major complications were hydronephrosis and a communication between the jejunum and the bladder.

Operation was attempted, but vainly, to eliminate the passage of intestinal contents through the urethra and the nephrectomy incision.

RESUMEN

Se comunica el caso de una paciente de

29 años de edad con carcinoma del cérviz uterino.

Después de histerectomía e irradiación ocurrieron una serie de complicaciones, siendo las mayores la hidronefrosis y una comunicación yeyunovesical. Se intentó una operación, inutilmente, para eliminar el paso de contenido intestinal a través de la uretra y la incisión de la nefrectomía.

ZUSAMMENFASSUNG

Es wird über den Fall einer 29-jahrigen Patientin mit Portiokarzinom berichtet. Im Anschluss an die Resektion der Gebärmutter und Bestrahlungen ergab sich eine Kette von Komplikationen. Diese bestanden im wesentlichen in Hydronephrose und einer Fistelbildung zwischen Jejunum und Harnblase. Eine Operation zur Ausschaltung des Abflusses von Darminhalt durch die Harnröhre und durch die Einschnittsstelle der Nephrektomie wurde versucht, war aber ohne Erfolg.

RIASSUNTO

Viene riferito il caso di una donna di 29 anni affetta da cancro del collo dell'utero.

All'isterectomia e alla terapia radiante seguì una lunga sequela di complicazioni, di cui le principali furono una idronefrosi e una fistola digiuno-xescicale. Invano si tentò di ovviare chirurgicamente al passaggio—e alla conseguente eliminazione del contenuto intestinale attraverso l'uretra e attraverso la lombotomia eseguita per la nefrectomia.

RÉSUMÉ

Le cas d'une patiente de 29 ans avec carcinome du col utérin est rapporté. Une série de complications survït après hystérectomie et irradiation. Les plus importantes furent une hydronéphrose et une communication entre le jéjunum et la vessie. L'opération fut tentée, mais en vain, afin d'éliminer le passage du contenu intestinal par l'urèthre et l'incision de néphrectomie.

SUMARIO

É apresentado o caso de uma paciente de 29 anos com carcinoma do colo uterino. Após histerectomia e irradiação ocorreu uma série de complicações, representadas por hidronefrose e comunicação entre o jejuno e a bexiga. A operação foi tentada, mas em vão, para eliminar a passagem do conteúdo intestinal pela uretra e incisão da nefrectomia.

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> There is no learned man but will confess he hath much profited by reading controversies; his senses awakened, his judgment sharpened, and the truth which he holds more firmly established. In logic they teach that contraries laid together more evidently appear; and controversy being permitted, falsehood will appear more false, and truth more true.
>
> —*Milton*

Management of Facial Injuries Resulting from Automobile Accidents

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ROUGHLY speaking, injuries of the face can be divided into two categories, those involving the soft tissue and those involving the supporting structures, namely, cartilage and bone. One must keep in mind that such a division is only arbitrary, since it is not infrequent for both systems to be involved in a single accident.

Considering first injuries of the soft tissue, there are four common categories: contusions, abrasions, lacerations and avulsions. Contusions are of little consequence when they occur alone, and ice packs or the injection of a solution containing hyaluronidase usually controls them promptly. They are important when they mask fractures, especially of the infra-orbital ridge or the zygomatic arch. The unsuspecting patient may notice the fracture for the first time when the swelling subsides a week or more after the injury, sometimes after the best chance of an accurate reduction has passed.

Abrasions usually cause slight concern. Healing is prompt and scarring is minimal. It stands to reason, however, that the deeper the abrasions the more scarring is apt to result. Of prime importance are the injuries in which various foreign bodies, particularly those containing pigment, are driven into and under the skin. These should be removed as promptly as possible in an effort to prevent permanent "tattooing." In some cases pigmented foreign bodies can be removed by ordinary cleansing; in other cases, complete excision offers the only hope. At any rate, removing them at the first operation, if the patient's general condition permits, appears to be the most conservative procedure. The fond wish, so often expressed, that the pigment will disappear as healing progresses seems to be infrequently realized.

Lacerations, like abrasions, assume added importance as their depth increases, when certain vital structures are divided and cavities lined with mucous membrane are involved. Repair of lacerations is an easy, although often time-consuming task when the basic principles of plastic surgery are followed. Careful cleansing of the wound is of foremost importance; this is accomplished by washing the surrounding skin with phisoderm or septisol containing hexachlorophene (and shaving when necessary), followed by prolonged irrigation with saline solution. Gentle handling of the tissues is a "must." All foreign bodies should be removed, hemostasis secured and hematomas evacuated. Removal of obviously dead tissue must be accomplished, but because of the generous circulation in the face, débridement can be kept to a *minimum*. *Obliteration of "dead space"* by the careful closure of muscle, fascia and fat in multiple layers is important. This is usually accomplished by the use of No. 4-0 or 5-0 plain catgut, and when it is properly done the skin can be closed with No. 5-0 or 6-0 silk without tension. Closure of the skin should be

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Dec. 12, 1954.

done with the finest suture available for the particular region involved, and with fine, full curved needles, so that accurate edge-to-edge approximation can be obtained. Care should be taken to place the sutures within 1 or 2 mm. of the skin edge. If this layer closure without cutaneous tension is performed, the skin sutures may be partially or completely removed in forty-eight to seventy-two hours. No suture or needle marks will remain under these circumstances. Vertical mattress sutures, designed to approximate both skin and deep structures, which are placed far back from the edge of the wound and under considerable tension, have no place in this type of repair. Primary repair of nerves should be done when possible, although the terminal filaments of both sensory and motor nerves of the face are usually difficult, if not impossible, to locate. The facial nerve or its major trunks are more readily located and can be successfully approximated. The divided parotid duct can usually be repaired without difficulty and troublesome salivary fistula avoided. A small caliber polyethylene catheter can be threaded from the mouth through the distal portion of the duct, then through the proximal portion and into the gland. The continuity of the duct can then be reestablished by closure of the wall with No. 6-0 silk. The nasolacrimal apparatus can be repaired in a similar fashion. Full thickness skin lacerations of lip, cheek, nose or eyelid require careful layer closure for maximum results. It seems most advantageous to begin within, first closing the mucous membrane and then working in layers to the skin. In the eyelid, where sutures placed in the conjunctiva are apt to abrade the cornea, careful closure of the tarsal plate may suffice. Conjunctival sutures of No. 6-0 silk with only two knots seem to cause little, if any, discomfort to the patient.

Loss of tissue by avulsion or surgical débridement of devitalized structures must be covered to convert open, contaminated wounds into closed, clean ones. It is rare-

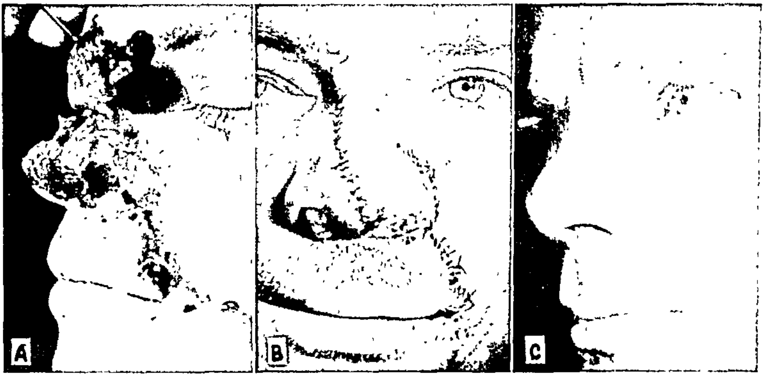

Fig. 1.—*A*, full thickness laceration of nose including injury of nasal bones and septum; full thickness laceration of upper lip, left, including skin, muscle and mucous membrane. *B*, appearance forty-eight hours after operation. Note position of external sutures and packing of nasal cavity with petrolatum gauze. *C*, postoperative view four months after inj

ly possible to plan definitive flaps when an emergency operation is being performed; the split thickness skin graft, however, is always available and makes an easy skin dressing. Not infrequently the result is satisfying enough to be permanent. The time saved by the liberal use of skin grafts in reducing painful dressings, improving healing and preventing fibrosis, scar contracture and tissue distortion is well known to all.

The nasal bones, being in a highly vulnerable position, are most frequently involved in fractures. These take two main forms, the depressed and the lateral deviation. It must be remembered that in all fractures of the nose the septum also participates, and correction of this difficulty is of the utmost importance for the patient's breathing. A satisfactory early reduction is certain to save future operations. Reduction is always an operating room procedure, requiring general anesthesia for children and local for adults. It is only after adequate anesthesia has been obtained that manipulation of the nasal bones and septum can be accomplished. When the bones have been properly reduced, the reduction must be maintained by the use of intranasal petrolatum gauze packing and an external splint held in position with adhesive strapping. Sutures used to close compound injuries are placed according to the aforementioned plan. When the vestibular skin or the nasal mucous membrane is involved in a circular fashion, it is well to remember that scar contracture can be severe enough to produce stenosis. An acrylic tube will aid in overcoming the late complication.

Fractures involving the infra-orbital ridge, the malar bone and the anterior portion of the zygomatic arch are best approached through the oral cavity. After reflection of the cheek from the maxilla the fragments are clearly in view, and their elevation is usually uncomplicated.

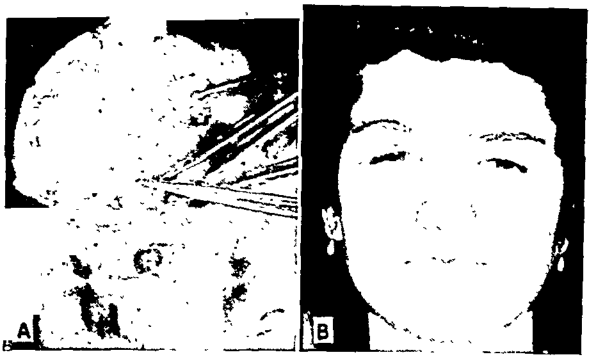

Fig. 2. — *A*, multiple lacerations involving the forehead, right upper and lower eyelids and cheek, with almost complete removal of triangular section of right upper eyelid. *B*, postoperative view five months later.

Because the fragments in the majority of cases are depressed into the maxillary sinus, it is necessary to pack the cavity with 1/4 inch (0.6 cm.) iodoform gauze to maintain reduction. Diplopia, produced by a fall of the orbital contents into the maxillary sinus, can be overcome by the same method. This pack, brought out through the incision in the buccal sulcus, is maintained in place for two to three weeks and removed, without anesthesia, in the surgeon's office. Fractures involving the zygomatic arch alone are best approached by the Gillies method.

When these fractures extend inferiorly and involve the alveolar ridge or the palate, it becomes necessary to use the teeth of the mandible as a splint. The teeth of the upper arch are fixed to an Erich splint after reduction and, after another such

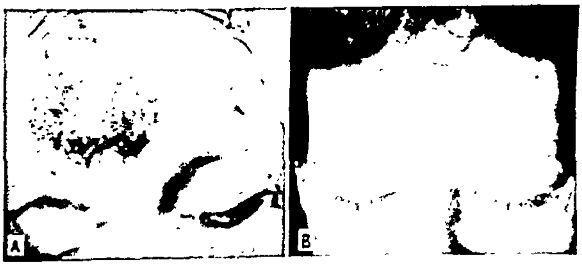

Fig. 3.—*A*, avulsion of the forehead, including skin, muscle and segment of periosteum. Denuded bone covered by muscle flap and split thickness skin graft. *B*, postoperative result two months after operation.

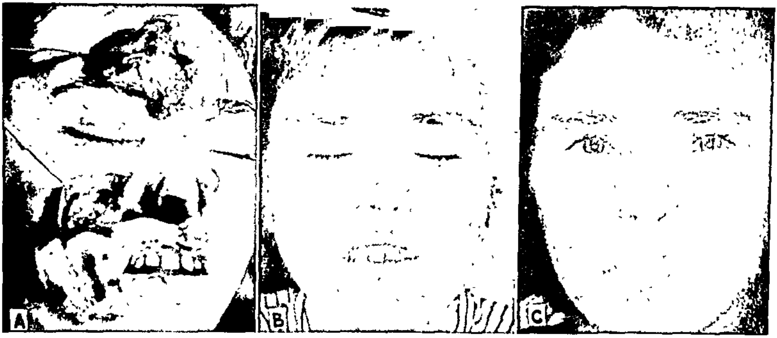

Fig. 4.—*A*, Multiple lacerations of face, partial avulsion of right upper lip and cheek, including loss of vermilion border and buccal mucous membrane. *B*, view five months after immediate suture of lacerations and application of split thickness skin graft to avulsed area of right upper lip and cheek. *C*, eleven months after injury. Flap transplanted from right arm, including skin and subcutaneous fat. Flap still requires the removal of subcutaneous fat, although two thinning procedures have already been performed.

splint has been applied to the lower arch, rubber band traction is used to maintain position and occlusion. In some cases half of the upper jaw becomes depressed, the lower fracture running through the midline of the alveolar ridge and palate. Such fractures can be well maintained in position by passing two Kirschner wires from side to side after reduction has been obtained. If it is necessary to pack the maxillary sinus, this must be done after the wires are in place.

Craniofacial separation, in which the entire upper jaw is loose from the skull, can usually be treated in a simple manner by using the mandible as a splint for the maxilla. Packing of one or both of the maxillary sinuses may be required. Elastic traction on Erich splints fixed to the teeth and a well applied Barton bandage complete the treatment. Within two to four weeks the fractures solidify and the restraints can be removed. Open reduction, with wiring around the bones and passing through the cheeks to a plaster headcap, is sometimes required in the "older cases" but tends to be cumbersome and should be used only when other methods are not feasible.

Mandibular fractures are usually multiple, involving, as a rule, the neck or angle on one side and the region of the mental foramen on the opposite side. Various combinations of fractures can be observed in any given case. Malocclusion of the teeth is common in all such injuries, and the object of therapy is the restoration of occlusion by the simplest measures available. The teeth of the upper jaw serve as a guide for the restoration of occlusion and also as a splint to maintain reduction. In the majority of cases the use of Erich splints or Stout multiple loop wires and elastic traction give satisfactory results. Healing takes place within six to eight weeks. The obvious disadvantage of this method is that the patient's teeth are fixed together and liquid feedings are required; this, however, is not a tremendous handicap. Some fractures, e.g., those at the symphysis and in the anterior portion of the body, lend th [illegible] e. [illegible] to fix tion with Kirschner wires. This permits the patient a more nearly normal diet but some have been refused employment because of the protruding wires.

Fractures of the neck with dislocation of the condyle rarely cause difficulty as long as occlusion is maintained during the healing process. Very rarely a displaced condyle has to be removed because its abnormal position blocks opening of the mouth or causes pain.

Edentulous mouths or those without a full complement of teeth increase the complexity of therapy. In these, open reduction with direct wiring of the fragments, performed either from the oral or the external approach, is necessary. The patient's dentures are a valuable guide to reduction of the fracture and at times may be useful as splints. On occasion, dental appliances are valuable in the reconstruction of various fractures.

SUMMARY

A number of common injuries of the face and facial bones are discussed. The multiple layer closure of lacerations by the method of lining the mucous membrane first and the other layers subsequently seems to require stressing again and again. In the treatment of fractures the simplest method possible is the method of choice. The use of the opposing dental arch as a splint for fractures of the maxilla or mandible is also important.

RÉSUMÉ

L'auteur discute un certain nombre de lésions de la face et des os de la face. Les différentes couches de la peau déchirée devront être recousues soigneusement avec les muqueuses de façon que la cicatrice soit le moins apparente possible. Dans le traitement des fractures, la méthode la plus simple est la meilleure. Le choix des appareils dentaires pour les fractures du maxillaire supérieur ou du maxillaire inférieur est très important.

ZUSAMMENFASSUNG

Eine Reihe häufiger Verletzungen des Gesichts und der Gesichtsknochen wird erörtert. Es scheint angezeight zu sein, immer wieder darauf hinzuweisen, dass der Verschluss von Weichteilzerreissungen in mehrfachen Lagen zu erfolgen hat, wobei erst die Schleimhaut und dann die übrigen Schichten versorgt werden. In der Behandlung von Knochenbrüchen ist die einfachste Behandlungsmethode die beste. Bei der Behandlung von Ober- und Unterkieferbrüchen ist die Benützung des dem gebrochenen Knochen gegenüberliegenden Zahnbogens als Schiene von Bedeutung.

RESUMEN

Se discuten una serie de lesiones comunes de la cara y huesos faciales. El cierre en capas múltiples de laceraciones por el método de cubrir la membrana mucosa primero y subsecuentemente las otras capas parece requerir énfasis una vez más. En el tratamiento de las fracturas el método mas simple posible es el de elección. El uso de un arco dental como molde para las fracturas de maxilar o mandíbula es también importante.

RIASSUNTO

Vengono descritte le lesioni traumatiche più frequenti della faccia Il metodo migliore rimane sempre quello della ricostruzione a strati incominciando dalla mucosa. Per quanto si riferisce alle fratture il miglior metodo è sempre il più semplice. Nella fratture della mandibola o della mascella l'immobilizzazione si ottiene utilizzando l'arcata dentaria opposta.

Management of Carcinoma of the Face

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I WISH to call attention to the early diagnosis and treatment of lesions of the skin which may and frequently are carcinoma or types of sarcoma. The publicity given by the Cancer Foundations has made the public conscious of the dangers of malignant disease, and more persons come to the physician for diagnosis and treatment than have come in previous years.

This new public attitude places the responsibility squarely in the hands of the physician, and it behooves him to give the proper advice and treatment.

The lesions that present themselves can be classed into three groups:

1. Hemangiomas
2. Moles
3. Papillomas

Parents bring children of very tender age with hemangiomas, fearing that they may be cancer. The typical history of these growths should be carefully explained to prevent unwarranted and sometimes disastrous treatment.

A hemangioma is an anlage of material of vascular origin. Various classifications of this condition depend on the rate of growth and the amount of embryonic material present. If there is a large amount of the material and the activating agent, whatever it may be, is intense, cavernous sinuses will develop and invasion is certain. The hemangioma never become malignant in the sense that it will metastasize, but it can be so considered because of its invasive ability. One can easily realize the variations that may occur in the lesion. The usual picture is typical of a very great percentage of cases. The lesion

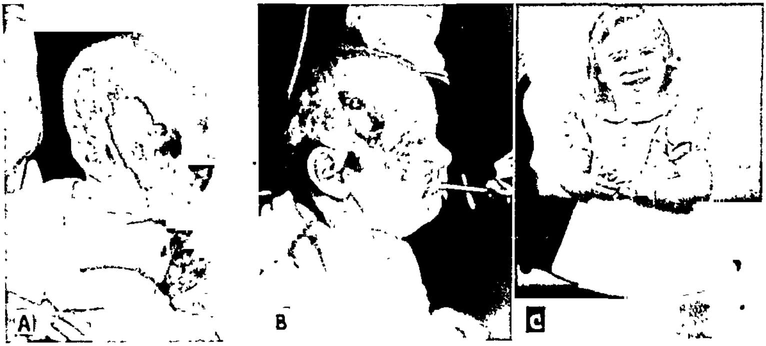

Fig. 1.—*A*, superficial hemangioma involving a large area of the face and eyelids, a portion of the lip and the left shoulder. *B*, partial excision of hemangioma with a full thickness skin graft in the eyelid. *C*, result after three years. The scars need further [illegible]. The [illegible] on [illegible] has cleared completely after an excision and a low [illegible]

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Submitted for publication Dec. 16, 1954.

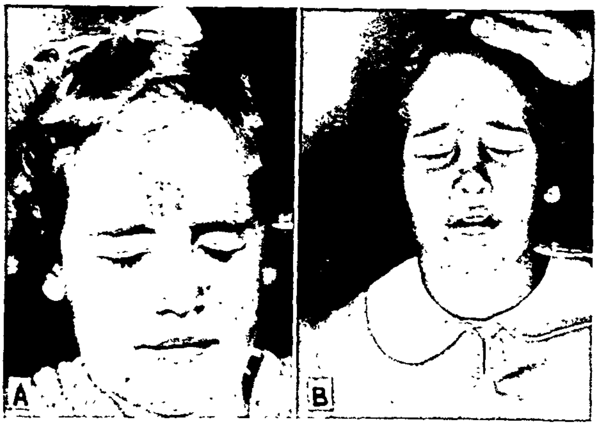

Fig. 2.—*A*, scar left after radium treatment of a hemangioma on the forehead. *B*, result after excision. The large circular scar made a satisfactory cosmetic result difficult to secure.

is often present at birth and is of variable size, usually about the size of a pinhead. Often it does not appear until ten days or two weeks after birth, beginning as a red spot that gradually increases in size, rises above the skin level and becomes intensified in color. The surface becomes pebbly, giving a strawberry appearance. Its growth will continue for three to five months and then cease unless the activating agent is intense. After this time the growth stops and degeneration may ensue. This is seen by a gradual change in color from bright red to bluish red and the initial flattening of the surface. The center gradually becomes whiter, finally having the color of the skin. This can progress until the hemangioma has entirely disappeared. The retrogression is very gradual, usually ending when the patient is eighteen months to two years of age. If the growth does not disappear by that time it should be removed by excision. There is another very superficial type that may involve large areas of the body. This type will invariably regress, leaving soft, loose, white skin that can be removed later. This group of tumors is included in this discussion because of the treatment which is frequently used (Fig. 1). Carbon dioxide snow will remove the outer portion but will not eliminate the condition unless the hemangioma is very superficial. Frequent treatments may result in unsightly scars. The most dangerous treatment is the use of roentgen rays or radium. It may re-

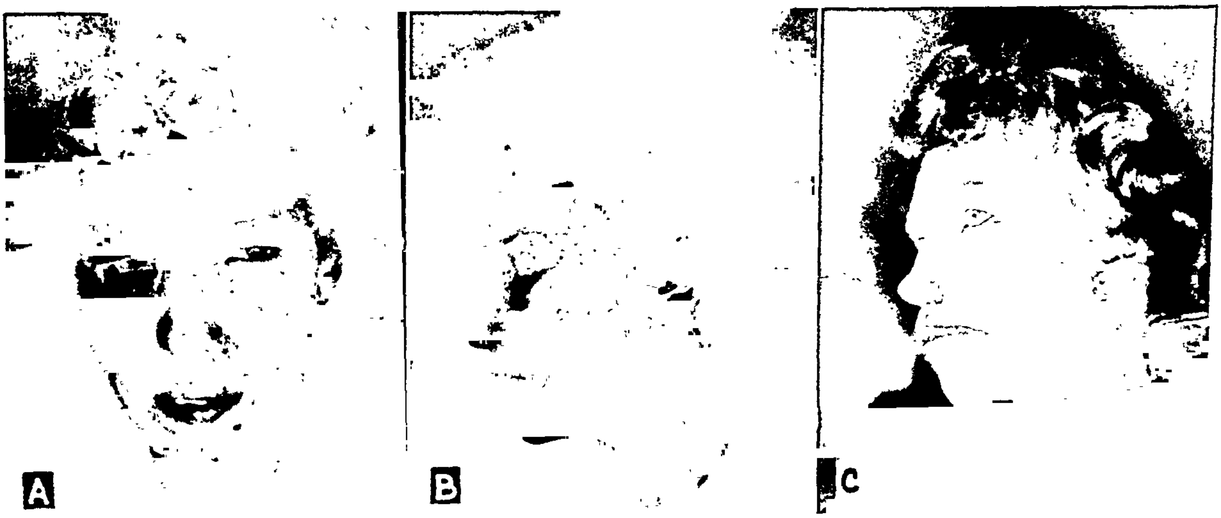

Fig. 3.—*A*, port wine mark involving the left side of the face. There are areas of ulceration caused by roentgen treatment, which was used to eliminate the condition. The danger of malignant change in these areas required the removal of the involved area. *B*, flap shifted from the neck into the upper lip and cheek, replacing over half of the involved area with normal tissue. *C*, flap shifted upward, permitting removal of the area to the eyelid. The eyelids were grafted and the area in the temporal region excised. The cosmetic result was fair, but the damaged skin was completely replaced.

move the superficial tumors without leaving any untoward effects if the treatment is carefully given. If, however, the hemangioma involves the whole thickness of the skin or deeper tissue, irradiation will frequently result in roentgen burns, which are potentially malignant and will require surgical treatment, more or less extensive, depending on the extent of the burn. It also has the added danger of stopping the normal growth of the bones beneath (Figs. 2 and 3).

The treatment of moles depends on their type and behavior. Most persons have many moles and it would be impossible to remove all of them; therefore, one treats only those which may become malignant. Moles can be classified roughly as flat, i.e., even with the surface of the skin, and raised, i.e., above the level of the skin. The flat moles are the more dangerous, especially if they are deeply pigmented and have indefinite outlines. Deep blue moles that look like tattoo marks should be excised, never treated with irradiation or desiccation. Any treatment that does not *insure complete removal may result in disaster.* If there has been a tendency to growth or increase in size, a wide area should be removed with the mole (Fig. 4).

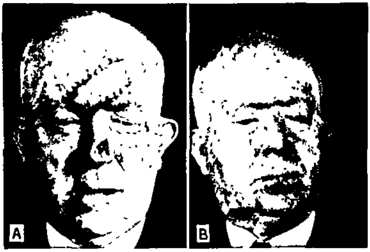

Fig. 4.—*A*, extensive radium treatment of a mole, resulting in extensive ulceration. A flap was raised on the forehead in preparation for removal of the lesion. The excised lesion revealed no sarcoma, but carcinoma was present. *B*, area excised and covered with a flap from the forehead. Area on the forehead covered with a full thickness skin graft.

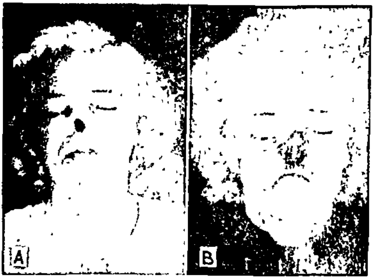

Fig. 5.—*A*, patient who had a small basal cell carcinoma near the tip of the nose. Multiple roentgen treatments over two years apparently stimulated the growth of the malignant tumor. The cartilaginous portion of the nose was then removed and the patient returned for reconstruction. *B*, view after further excision indicated by biopsy which revealed that the tumor had not been completely excised, so that without further excision the reconstruction could not be started. The disease extended further and at present involves more of the face, invading the antrum and the areas beneath the eye. Reconstruction is impossible; the lesion is beyond repair.

Raised moles may be pigmented to various shades of brown or may be as clear as the surrounding skin. Moles in areas where shaving, combs or haircutting may cause trauma can be removed by desiccation. Should there be a history of weeping, deep pigmentation or increased growth, the mole should be excised with a good margin. Pathologic examination will determine whether malignant change has taken place.

Hairy moles rarely tend to be malignant. These can be desiccated, but the deep-seated hairs will tend to reappear. Surgical removal gives a more satisfactory cosmetic result. If one is reasonably sure that the mole is benign, the desiccation should not be too intense, lest a white pock mark be left. The patient can return in three weeks for further treatment i ll

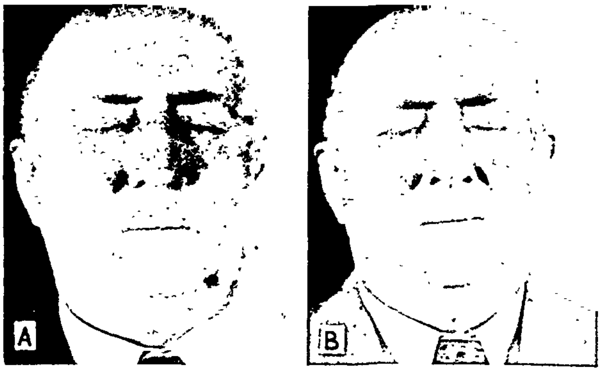

Fig. 6.—*A*, basal cell epithelioma treated with radium, which caused a burn of the skin and no improvement in the lesion. *B*, area excised and covered with a split thickness skin graft.

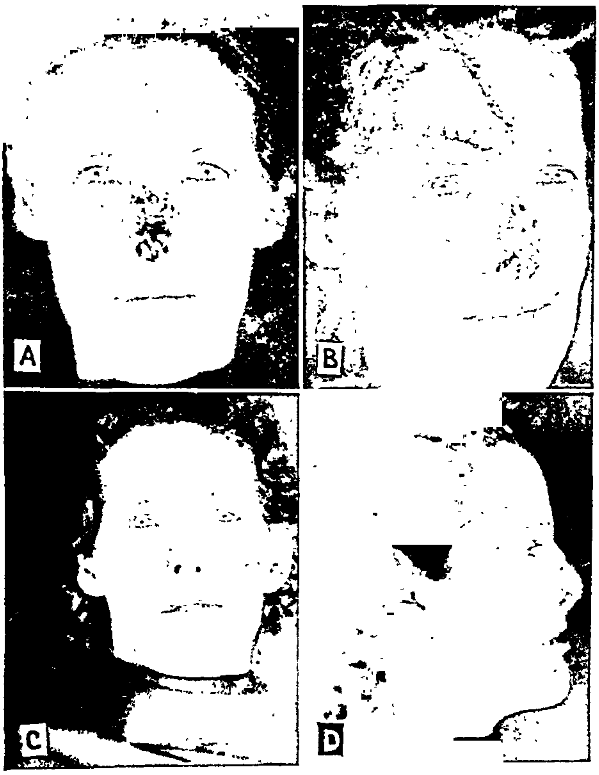

Fig. 7.—*A*, severe infection over the bridge of the nose, resulting from prolonged roentgen treatment of a basal cell epithelioma. *B*, flap raised on forehead. Nose treated and infection cleared. Note basal cell erosion over the bridge of the nose and destruction of the nasal tip. *C* and *D*, flap inserted into area where lesion had been excised.

of the mole has not been removed. This method offers satisfactory end results, leaving little or no noticeable scarring.

Small growths appearing in the upper portion of the face may look like moles, having the same color as the skin. These usually have small crater surfaces, and there is a history of some weeping. These growths invariably are basal cell tumors. Roentgen treatment can be used, but if there is not a definite improvement after two or three treatments excision is advisable. Some of these growths seem to be irritated by irradiation and tend to grow rapidly (Fig. 5). Patients with these lesions should be warned against exposure to the sun, which may be an irritating factor. More than one lesion may be present at the same time; multiplicity, therefore, does not eliminate the possibility of malignant change. Biopsy, in my opinion, is unnecessary. If a biopsy is to be done, excision seems to be the rational procedure. Excision need not be extremely radical. A recurrence is not disastrous, and further excision will suffice to cure the patient (Fig. 6).

The early squamous cell carcinoma (Fig. 7) usually appears as an ulcer that does not tend to heal and gradually increases in size. Most frequently observed on the lower lip, it should be promptly treated. Excision with a good margin is the most desirable treatment. Radical procedures need not be done unless there is involvement of the lymph glands or invasion of the bone. The prognosis is so poor in such cases that one should consider the problem conservatively. A recurrence, or later involvement of the lymph glands, will justify radical treatment.

When radical treatment is necessary, reconstruction should be carried out in the simplest possible form. Closure of the skin and maintenance of occlusion with dentures or wires is desirable. An extensive reconstruction is not indicated until one is reasonably sure that there will not be a recurrence or metastasis into various organs.

SUMMARY

The public has become cancer-conscious, so that many more patients come for advice concerning various growths. The most frequent growth seen in children is a hemangioma. The depth of the tumor in the skin and the rate of its growth will help to determine the time of treatment. Roentgen or radium treatment should be used carefully. These methods can be used for superficial hemangiomas with satisfactory results but the deeper tumors can be eradicated in this manner only with great danger of causing burns. These can become malignant and must be treated as possible malignant conditions. The most satisfactory treatment, in the author's opinion, is excision of the lesion if necessary.

Moles can be considered for removal if they change in size, take on color or tend to weep. Moles in areas where there is danger of trauma from belts, straps and the like should be removed. Raised, lightly pigmented moles can be removed by desiccation. Deeply pigmented flat moles should be excised if they appear to be active in any way. Deep blue flat moles with indefinite outlines should always be excised promptly.

Basal cell growths, which appear usually as lightly pigmented raised moles with small ulcerated or indented tops can be treated by irradiation if one so desires. If the tumor does not respond after two or three treatments, however, it should be excised. Frequently this type of growth is stimulated by irradiation, and a serious situation may result. A diagnostic biopsy specimen may be used for tabulating end results, but it seems unnecessary; the growth should be excised completely.

Squamous cell growth should be excised with a good margin, and the involvement of glands will determine whether a radical operation is necessary.

Reconstruction of any extent should not be carried out until sufficient time has elapsed to determine whether there will be recurrence and/or metastasis.

When a patient has any type of malignant growth, he should be instructed about exposure to wind and sun. Because the tendency to malignant growth is present, he should be instructed to consult a physician at intervals, especially if any growth appears or there is any tendency for moles to become active.

ZUSAMMENFASSUNG

Das Erwecken der Aufmerksamkeit der Öffentlichkeit in Bezug auf das Krebsproblem hat dazu geführt, dass eine erheblich grössere Anzahl von Kranken ärztlichen Rat wegen verschiedener Geschwülste sucht. Bei Kindern stellt das Haemangiom die am häufigsten beobachtete Geschwulst dar. Die Tiefenausdehnung der Geschwulst in der Haut und die Wachstumsgeschwindigkeit spielen bei der Bestimmung des Zeitpunktes der Behandlung eine Rolle. Röntgen- und Radiumbestrahlungen sind mit Vorsicht anzuwenden. Diese Verfahren ergeben bei oberflächlichen Haemangiomen befriedigende Resultate. Tiefer liegende Geschwülste lassen sich jedoch auf diese Weise nicht ohne grosse Gefahr von Verbrennungen ausrotten. Solche Schädigungen können bösartig werden und müssen als potentiell maligne Erkrankungen behandelt werden. Die am meisten befriedigende Behandlung besteht nach Ansicht des Verfassers in der Resektion des Krankheitsherdes, wenn notwendig.

Naevi kommen für chirurgische Entfernung in Betracht, wenn sie an Grösse zunehmen, Farbveränderungen aufweisen oder zu nässen anfangen. Muttermale in Körpergegenden, die der Gefahr von Verletzungen durch Gürtel, Bänder und ähnliches ausgesetzt sind, sollten entfernt wer-

den. Erhabene leicht pigmentierte Naevi können mit Austrocknungsverfahren beseitigt werden. Stark pigmentierte flache Muttermale sollten reseziert werden, wenn sie irgendwelche Zeichen der Aktivität aufweisen. Dunkelblaue flache Naevi mit unscharfer Begrenzung sollten in jedem Fall sofort durch Exzision beseitigt werden.

Basalzellengeschwülste, die sich gewöhnlich als leicht pigmentierte erhabene Naevi mit kleinen oberflächlichen Geschwüren oder Eindellungen darstellen, können nach Belieben mit Bestrahlungen behandelt werden. Spricht jedoch die Geschwulst auf zwei oder drei Behandlungen nicht an, so sollte sie reseziert werden. Diese Geschwulstform wird oft durch Bestrahlungen stimuliert, woraus sich ernste Folgezustände ergeben können. Zur Feststellung der Endergebnisse kann man eine Probeexzision vornehmen, was allerdings überflüssig erscheint. Die Geschwulst sollte im ganzen entfernt werden.

Schuppenzellgeschwülste sollten mit einem reichlichen Rande im gesunden Gewebe reseziert werden. Ob eine radikale Operation nötig ist, hängt von der Beteiligung der Lymphknoten ab.

Die Ausführung plastischer Wiederherstellungsoperationen in nennenswertem Umfang sollte aufgeschoben werden, bis genügend Zeit verstrichen ist, um festzustellen, dass man vor Rückfällen oder Metastasierungen sicher ist.

Kranke mit einer bösartigen Geschwulst irgendwelcher Art im Gesicht müssen davor gewarnt werden, ihre Haut dem Wind und der Sonne auszusetzen, und darauf aufmerksam gemacht werden, dass sie eine Neigung zur Entwicklung bösartiger Geschwülste besitzen, die eine ärztliche Untersuchung in gewissen Zeitabständen erforderlich macht, besonders wenn neue Geschwülste auftreten oder bei schon bestehenden Muttermalen sich Zeichen von Aktivität bemerkbar machen.

RIASSUNTO

Il maggior livello culturale del pubblico ha fatto aumentare il numero dei pazienti che si rivolgono al medico col dubbio di avere un tumore. La neoplasia più frequente nei bambini è l'emangioma. L'indicazione alla sua cura dipende dal suo sviluppo e dalla sua estensione La Roengten e la Radium terapia devono essere impiegate con grande prudenza; infatti consentono di ottenere soddisfacenti risultati nelle lesioni superficiali, mentre possono determinare gravi ustioni nel tentativo di distruggere emangiomi profondi. Vi è inoltre il pericolo che queste lesioni possano diventare maligne e il miglior metodo di cura, secondo l'Autore, è l'asportazione chirurgica. Per quanto si riferisce ai nei, l'asportazione deve essere presa in esame quando essi tendono a crescere, a mutare colore o a divenire secernenti, o anche quando si trovano in regioni esposte a traumi per la presenza di cinture o simili. I nei sporgenti e poco pigmentati possono essere cauterizzati; quelli piatti molto pigmentati devono essere asportati chirurgicamente al primo segno di attività; quelli piani di colorito blù intenso con contorni sfumati devono essere tolti prontamente. Le neoplasia basocellulari, che di solito si mostrano come nei sporgenti, poco pigmentati e con piccole ulcere alla sommità possono essere irradiati, ma se non rispondono dopo 2 o 3 applicazioni, si devono asportare anche perchè questi tumori spesso vengono stimolati dai raggi e possono portare gravi conseguenze. L'asportazione deve essere completa. I tumori a ce lule pavimentose devono essere asportati assieme ad una parte di tessuto sano e con le linfoghiandole, se sono invase. La successione plastica non deve essere fatta fino a che non sia trascorso un periodo di tempo sufficiente a garantire dalla eventuale recidiva o metastasi. Qualunque sia il tipo di tumore maligno, il paziente deve essere informato sui pericoli dell'espozi-

zione al vento e al sole e deve essere invitato a presentarsi a periodiche visite di controllo.

RESUMEN

El público se ha vuelto más conciente del cáncer y muchos pacientes recurren al médico buscando consejo en relación con diversas tumoraciones. La tumoración más frecuente vista en los niños es el hemangioma; su profundidad en la piel y el grado de crecimiento ayuda a determinar el tiempo de tratamiento. Los tratamientos roentgen y radioterápicos deben usarse cuidadosamente, pudiendo ser usados para hemangiomas superficiales con resultados satisfactorios. Sin embargo, los turmores más profundos no pueden erradicarse de esta manera sino con gran peligro de producir quemaduras. Estos hemangiomas pueden volverse malignos y deben tratarse como posibles padecimientos malignos. Según la opinión del autor el tratamiento más satisfactorio es la extirpación de las lesión si es necesario.

Las molas pueden considerarse para extirpación si cambian de tamaño color o tienden chorrear. Las molas en áreas con peligros de traumatismo a partir de cinturones o tirantes, etc., deben extirparse. Las molas salientes ligeramente pigmentadas pueden extirparse por desecación. Las molas planas profundamente pigmentadas deben extirparse si manifiestan actividad en cualquier sentido. Las planas, azules con límites indefinidos siempre deben extirparse precozmente.

Los crecimientos basocelulares que aparecen usualmente como molas pigmentadas y salientes y con puntas ligeramente ulceradas, pueden tratarse por irradiación si se desea. Si el tumor no responde después de dos o tres tratamientos debe extirparse. Frecuentemente este tipo de crecimientos se encuentra estimulado por irradiación y puede resultar una situación grave. La biopsia diagnóstica puede usarse para estimar los resultados, pero parece ser innecesaria; el crecimiento debe extirparse completamente.

Los crecimientos espinocelulares deben extirparse con un buen márgen, determinando la complicación de los ganglios la necesidad de una operación radical.

La reconstrucción no debe realizarse sino después de cierto tiempo que determine si habrá recurrencia y/o metástasis.

El paciente con cualquier tipo de crecimiento maligno debe instruírse a cerca de la exposición al aire y al sol. A causa de tendencia hacia la malignidad debe instruírse al paciente a consultar un médico a intervalos, especialmente si aparece cualquier crecimiento o existe tendencia de las molas a hacerse activas.

RÉSUMÉ

Le public étant plus instruit sur le cancer, les patients consultent plus facilement un médecin pour une tumeur quelconque. La plus fréquente chez l'enfant est l'hémangiome. La profondeur de la tumeur sous la peau et le degré de sa croissance aideront à déterminer le moment du traitement. La roentgenthérapie et le radium devront être utilisés avec prudence. Ces méthodes peuvent donner des résultats satisfaisants dans les hémangiomes superficiels, mais pour les tumeurs profondes, il existe un danger de brûlures et de transformations malignes. Dans ces cas le meilleur traitement, selon l'auteur, est l'excision de la lésion.

Les naevi qui se colorent, suintent, augmentent de volume et situés dans une zone soumise à des traumatismes (ceinture, boucle, etc.) doivent être extirpés. Il en est de même des naevi plats profondément pigmentés ou bleu foncé qui montrent une activité quelconque.

Les tumeurs à cellules basales, à surface ulcérée ou bosselée, qui ont en général l'apparence de naevi [illegible]

mentés, peuvent être traitées par l'irradiation. Mais si la tumeur ne réagit pas après deux ou trois séances, elle devra être excisée, car elle risque de devenir maligne.

Quant aux grosseurs cellulaires squameuses, elles devront être excisées largement jusqu'en tissu sain.

Les plastiques, quelle que soit leur étendue, ne devront pas être pratiquées avant qu'il soit possible d'éliminer avec certitude la possibilité d'une récidive.

Tout patient atteint d'une tumeur doit savoir qu'il faut éviter de l'exposer au vent et au soleil, et qu'il est nécessaire de consulter régulièrement un médecin, afin que celui-ci puisse diagnostiquer éventuellement une dégénérescence maligne.

◆

In everyday life we assume that the people around us are experiencing feelings and acting purposefully because this is usually true of ourselves. This assumption is near enough to the truth to serve fairly well in dealing with our fellow-men. We can adjust our actions to those of others better by inferring their emotions and purposes than by mere observation of their objective behavior. If a rolling stone approaches us we observe its direction of motion and get out of its path; but if a person moves toward us we infer from objective signs whether his *purpose* is to greet us or attack us, and act accordingly. We can thus adjust quickly and fittingly to actions of companions on the basis of inferred subjective states better than by observing and acting on objective facts only.

The same is true in dealing with all animals of the higher type. We deal with them as if they were animated by purposes, and not as we do with non-living objects and machines. The actions of men and animals may be mechanically determined, but under ordinary circumstances we can adjust to them more successfully by supposing them to be animated by purpose than by any knowledge we have or can gain of their usual organic mechanisms. Man always has made and probably always will thus make use of inferred knowledge of subjective states in reacting to his fellow-men.

—*Kirkpatrick*

The Pelvic Blood Vessels in Gynecologic Surgery

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IN *the recent extension of surgical* operations in the treatment of pelvic disease (as no doubt in the treatment of disease in other parts of the body), it seems that, although there is now more blood available, the blood vessels are fewer or less able to carry it.

For the most part, gynecologic operations are performed on the pelvic viscera, namely, the ovary, uterus, tube, vagina and vulva, upon which the survival of the patient does not immediately depend. But with the introduction of extensive extirpation of organs and tissue masses in cases of invasive and spreading cancer the scope of the procedures involves the ureter, the bladder, the bowel and the large pelvic blood vessels—which, incidentally, means also the lower limbs.

The pelvic genital organs have peculiar advantages, with respect to their blood vessels, over many other parts, in that they are centrally placed and all have a bilateral blood supply. This can be said, too, of the bladder and to a certain extent of the rectum. The difficulties of vascular deficiency, therefore, hardly arise in operations upon the genital organs alone. They become a matter of vital importance, however, in operations involving the structures on the lateral pelvic wall, namely, the blood vessels supplying the bladder, the bowel, the ureter and, last but not least, the leg. The fact is that in operating on cancerous growths in the pelvis, be they primary or secondary, the surgeon must face the possibility of devascularization accidents to the ureter, bladder, bowel and leg and be ready to treat them. Should he deem a condition inoperable and close the abdomen if he finds a mass of malignant nodes or tissue adherent to the large vessels? Should he go on and attempt to remove the mass and risk an injury to the vessels? These must be, and are, questions constantly before the gynecologist.

Te Linde[1] has warned that "the chances of removing all cancer cells after they have extended extensively into pelvic lymphatics are slight. The location of lymph nodes in close proximity to the great vessels makes it extremely difficult to remove them in toto and leave the walls of the great vessels intact."

Javert,[2] however, has noted that pelvic lymph node metastases occur in much greater frequency (28 per cent) than does adnexal spread (10 to 12 per cent). Yet what gynecologist, he asked, "fails to remove the adnexae when operating for endometrial cancer?" He then proceeded to advise complete pelvic lymphadanectomy. It seems that that principle of radical surgery should apply to the treatment of cancer of the vulva, the ovaries and, in some circumstances, of the cervix.

Brunschwig,[3] in the course of describing his operative procedures for cancer of the cervix, advised that "attention is now

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Dec. 21, 1954.

directed to the hypogastric artery which is isolated, divided and ligated." And further, in recounting operative complications, he mentioned that "the large vessels which are most likely to be inadvertently entered are: (a) hypogastric veins, (b) external iliac vein, (c) terminal portion of the vena cava, (d) large gluteal veins, (e) veins about the sciatic nerve, (f) veins perforating the anterior sacral foramina, (g) external iliac artery." Kelso,[4] in the same connection, recorded an accident in which "apparently due to the use of an improvised retractor, the right common iliac artery was completely severed as it bifurcated into internal and external branches."

In discussing lymphadanectomy in the surgical treatment of cancer of the cervix, in particular favor of which this paper is not written, Peterson and Hornbrook[5] said, "It is most important to strip every vessel down to the bare muscular wall and to remove completely all fatty and areolar tissue in the pelvis above the levator muscles, laying bare the veins and muscles of the bladder, the muscles of the rectum, the ureters, and the psoas muscles. This makes the procedure a tedious one, more liable to blood vessel hazards and more liable to urinary complications. However, it is felt by these authors that it must be done to accomplish the purpose for which the surgery is done; namely, removal of the lymphatics which may contain carcinoma cells as evidenced by this series." In referring to vascular complications, they suggested that "material should be available for arterial, bowel, bladder and ureteric repairs," and they mentioned 3 vascular injuries; namely, opening of the external iliac artery, opening of both common iliac veins and opening of one common iliac vein.

Because cancer is generally a "disease of later life," cardiovascular disease may add greatly to these dangers of radical pelvic operations and, obviously, especially so if there has to be much handling and disturbance of the large arteries, with consequent thrombosis or embolism and a call for collateral circulation.

Recounting the surgical history of 2 cases of pelvic malignant disease will serve to illustrate the situation I have in mind, in which dissection round the large vessels on the side walls of the pelvis was undertaken.

REPORT OF CASES

CASE 1.—Mrs. C. W., 62 years of age, entered the hospital complaining of a tumor in the right lower quadrant of the abdomen. Her previous health had been good except for an illness three years earlier when she had undergone a total hysterectomy in another town for adenocarcinoma of the endometrium. The right ovary and tube were not excised at that time, and the reason for such limitation of the operation could not be ascertained. The "tumor" of which she was now complaining visibly bulged the abdominal wall in the right lower quadrant; two likely diagnoses were malignant ovarian tumor and recurrent adenocarcinoma. The latter proved to be the correct one, and the mass was excised in the course of a right transperitoneal pelvic lymphadanectomy. The malignant tissue was densely adherent to, covered and encircled the whole length of the external iliac vessels, the hypogastric artery and its anterior branches and also the obturator nerve. The operation was performed with the patient under spinal anesthesia and occupied one hour and forty-five minutes. The manipulation of the vessels in dissection of the tumor mass produced extreme spasm of the external iliac artery and vein. The vessels were not obviously contused. There was very little bleeding, and the anesthetist recorded no significant drop in blood pressure. Just before the parietal peritoneum was closed the artery was still in tight spasm. Three hours after the operation the patient was complaining of pain in the right calf. The nonsuccess of an attempted sympathetic block to bring relief from pain and restore the popliteal pulse led to lumbar sympathectomy and later popliteal exploration. These procedures were also unsuccessful in reestablishing the circulation in the leg and eventually a midthigh amputation was necessary. No roentgenograms of the blood vessels in the amputated limb were taken, but the pathologist reported that the popliteal artery showed thickened walls and marked atheroma. Subsequently there was a recurrence of the growth at the brim of the pelvis on the right side, which this time obstructed the ureter. No attempt was made to excise this growth, but the kidney was removed to relieve the patient of the severe symptoms of pyelonephritis.

At the time of the lymphadanectomy, except for the massive secondary growth in the iliac and hypogastric lymph nodes, no other metastatic tumor was seen. In spite of the extensive involvement of the large vessels, the tumor apparently did not invade the walls of the artery or vein, and therefore an intra-arterial growth as a possible nidus for the formation of a thrombus and embolus was considered unlikely. Damage of the intima during the operation is a more likely explanation of the accident, but it cannot be denied that the severe and unduly prolonged spasm of the iliac artery may have caused such slowing of the blood stream as to allow clotting of blood in the diseased arteries distal to the spasm and plugging of the main stems.

CASE 2.—Mrs. J. M., at the age of 51 years, had squamous epithelioma of the cervix, Stage I. She refused treatment by roentgen rays and radium because, as she put it, she had already been given radium therapy for postmenopausal bleeding and in spite of it had "developed cancer." She was considered a poor risk for extensive operation, on account of chronic cardiovascular renal disease, and therefore total hysterectomy was performed. No enlarged nodes were noticed. The patient remained well for two years, but at a routine examination at the end of that time a hard mass was discovered, fixed to the right side of the pelvis. There were no other signs of cancer. Bilateral lymphadanectomy was performed with the patient under spinal anesthesia. The large vessels were exposed from the bifurcation of the aorta to the inguinal ligaments on each side. The nodes on the right side happened to be larger than those of the left, but malignant tissue was observed on both sides in the hypogastric nodes. It was these nodes particularly that were densely adherent; indeed, fixed quite solidly to the hypogastric arteries and the nearby external iliac artery and vein and obturator nerve. These nodes had to be painstakingly cut rather than dissected bluntly from the vessel walls and nerves. The veins and arteries submitted to much handling and dissection shrank down to hard white cords like butcher's string. In this case the spasm did not last too long, and the blood supply to the legs was not dangerously obstructed in spite of the patient's poor vascular system and the absence of any special attempt to avoid such a catastrophe.

Fourteen months after the lymphadanectomy this patient was readmitted to the hospital with gastric obstruction. This was caused by a metastatic retroperitoneal tumor encroaching on and crushing the duodenum. Surgical treatment was limited to posterior gastroenterostomy, from which the patient made a good immediate recovery. She died nine months later, four years after the original operation, and the death certificate indicated bronchopneumonia and pulmonary metastases.

For the moment all the details of these cases are not so important as the fact that, in 1 of 2 quite comparable cases, in both of which there was extensive dissection around the iliac vessels, acute arterial occlusion took place. The utter novelty of this serious complication of a gynecologic operation prompted the writing of this paper.

Extensive Pelvic Operations.—In many common major gynecologic operations a large vessel may be, but happily rarely is, accidentally opened, torn or otherwise damaged, so that to a limited extent the management of simple but perhaps vital vascular accidents is constantly before the surgeon. The vascular complications to which I have already referred, however, are more likely to be produced in the course of operations designed to eradicate malignant disease of the pelvic organs and the associated lymph nodes. In cases of cancer of the vulva, the inguinal and pelvic lymph nodes may be invaded and infected and doubly adherent, so to speak, to surrounding tissues and vessels. Pelvic lymphadanectomy may be part of the surgical treatment of cancer of the cervix and uterus. Sometimes it is employed as a secondary part of c[illegible] [illegible]adiation and [illegible] commonly, and certainly with greater hazard, radical excision of the pelvic organs and lymph nodes is a relief measure in cases of recurring or persisting cancer and also in cases of postradiation necrosis.

The surgical treatment of malignant disease of the ovaries is often summarized in these words: remove as much as possible. No doubt it depends on the judgment and operating skill of the surgeon as to what that means in terms of the extent of dissection performed and the amount of tissue removed from the side walls of the pelvis. In cases of cancer of the bowel with peritoneal and pelvic secondary growths often adherent to or growing in pelvic organs and lymph nodes, the dangers inherent in dissecting the large blood vessels must be assumed if any attempt is made to excise malignant tissues completely.

Vascular Accidents. — In general, the problems of vascular accidents and disorders as the gynecologist encounters them are centered around thrombosis of veins and arteries; vasospasm resulting from thrombosis and operative trauma with local segmental spasm; accidental tearing or cutting and, finally, the attack on blood vessels made by spreading malignant disease.

In particular, the gynecologist has to consider, sooner or later, such immediate surgical problems as the temporary control of the blood flow in a large artery or vein while he performs a repair in the wall of the vessel or decides to ligate it. In the case of the large artery that has to be ligated there arises at once the question of whether the accompanying vein should be occluded too. It seems that concomitant ligation of the vein is not necessary. Autogenous vein grafts or homologous grafts from a blood vessel bank, or some other form of prosthesis, should be available at least in the large surgical centers, so that the surgical treatment of malignant conditions may not be limited by the want of such adjuncts to treatment when the replacement of vital blood vessel tissue is indicated. If it is, on the other hand, a vein that has to be ligated as the result of cutting or tearing in the course of treating thrombo-embolism and multiple infarction, then, quite apart from considerations of choosing the best site for control of emboli from one or both lower limbs, special thought should be given to devising collateral circulation. Indeed, whether it is a large vein or an artery that has to be ligated or excised or a large vessel that has shut down in extreme spasm or has become otherwise occluded, anxiety always arises about establishing an adequate collateral circulation and maintaining it.

Because acute vasospasm may be the ultimate cause of thrombosis and the development of emboli, anticoagulants may be employed to tide the patient over a very critical period. The risk of using the anticoagulants after an extensive pelvic operation and causing internal hemorrhage must be calculated against the possibility of further embolic obstruction of a major blood vessel and its serious consequences.

Vasospasm accompanies thrombosis to a greater or lesser degree and also quickly develops in its worst forms in vessels subjected to much mechanical stimulation and trauma.[6] The spasm of the vessel or vessels may spread widely and affect large areas, and it may last for hours or days. A differential diagnosis between spasm and organic obstruction may have to be made if delay in establishing the proper treatment is not to prejudice the therapeutic outcome. Clinical plethysmographic and arteriographic studies could, with great advantage, be made available to the investigators of these vascular disorders.

The treatment of vasospasm may take

the form of sympathetic procaine block or section of the sympathetic nerves at the level of the paravertebral chain. Other doubtfully effective methods employed to abolish vasospasm are remote limb-heating, local heat and the administration of certain sympathicolytic drugs such as Priscoline, Dibenamine and tetra-ethyl ammonium chloride. The widespread action of these drugs on the entire sympathetic system constitutes a certain but unavoidable disadvantage, especially when the vasospasm or other obstruction is more or less localized. The drugs cause generalized vasodilatation, and the response is most marked in the nonpathologic areas, with consequent relative decrease in the blood supply to the sections most in need of improvement. Recently, Kinmonth[7] has shown that papaverine sulfate, in 2.5 per cent solution, when applied directly to the spastic segment of the vessel, relaxes the spasm rapidly and relatively permanently. I have not found this to be the case in pelvic operations.

An adequate blood volume is, of course, necessary to maintain normal circulation, and a plethora is accompanied in dilated vessels. On the other hand, marked reduction in blood volume may lead to a general constriction that must add considerably to the difficulties of the situation if not immediately corrected.

As was pointed out by Quiring[8] in his magnificent treatise on collateral circulation, all the large arteries and veins in and around the pelvis and thigh have representative collateral channels in case of obstruction, and some of these are very devious. The vessels of the centrally placed pelvic organs form a very important secondary link in the chain of supply or drainage. Should the main vessel to the leg be obstructed, the crossover, so to speak, may be most important in a new anastomozing system of collateral channels to and from the thigh.

It is now evident, even if it was not always so, that modern, radical pelvic operation for malignant disease not only involves the main blood supply to the legs on one or both sides of the pelvis in hazardous manipulations but removes, to a great extent, the large emergency anastomotic vascular bed in the center of the pelvis, without which a collateral blood supply between one side and the other cannot be confidently established. It must be pointed out, however, that the blood circulation in and around the pelvis and thighs does not wholly depend on these pelvic vessels; to a certain extent it may be built up through many superficial parietal vessels—the arteries and veins in the pelvic girdle and backbone and the vascular channels of the bowel—and the better so if there is no cardiovascular disease with thickening and inelasticity of the vessels.

If, then, the very operation that diminishes the chances of collateral circulation also may be complicated by damage to, or actual destruction of, a part of a main vessel to the leg, the responsible gynecologist must consider these potential dangers and stop before they are precipitated or make provision for their circumvention or treatment. It is easy to be wise after the event, and this may be a policy of perfection; but if malignant tissue—and inflamed tissue and abscessed nodes—are adherent to, pressing upon and perhaps occluding the vessels, with dense adhesions complicating the issue, the gynecologist who deliberately sets about clean dissection must be prepared to "go the limit" and replace a section of, for example, the iliac artery. This attitude, though not yet always achieved, was well demonstrated by Hughes,[9] Jahnke and Seeley[10] and Whitaker, Durden and Ferguson,[9] who have described so well the modern treatment of [illegible] vascular juries and their repair or cure by grafting.

The presence of spreading lethal cancer, however, may not be the only reason for going on with the operation. The pain and partial or complete muscular immobilization involved in chronic vascular obstruction should be an added incentive to attempt removal of the growth.

In conclusion, let me quote Osbert Sitwell and suggest that we further seek "the wisdom of the blood — that fragile scarlet tree we have within us."

SUMMARY AND CONCLUSIONS

1. The scope of radical operation for pelvic cancer is shown to include the large blood vessels of the pelvis and the blood supply to the leg.

2. For the sake of illustration, 2 cases are described in which dissection around the large blood vessels led to serious and surprisingly severe vasospasm, in 1 of the 2 cases with eventual gangrene and amputation of a leg.

3. Vascular injuries in pelvic surgery and their complications and treatment are discussed.

4. The possible effect of removing certain pelvic organs and tissue on anastomozing systems and collateral channels around the pelvis and legs is described.

5. It is suggested that pain in and about the pelvis and legs in patients with pelvic cancer may be due not only to pressure and invasion by malignant tissue but to chronic vascular obstruction. This may be an added reason for attacking malignant tissue attached to or pressing upon the pelvic blood vessels.

ZUSAMMENFASSUNG

1. Es wird auseinandergesetzt, dass der Rahmen einer radikalen Operation des Krebses des kleinen Beckens die grossen Blutgefässe des Beckens und die Blutzufuhr zum Beini einschliesst.

2. Zur Erläuterung werden zwei Fälle beschrieben, in denen die chirurgische Präparierung in der Umgebung der grossen Blutgefässe zu ernsten und überraschend heftigen Gefässkrämpften führte; in einem der beiden Fälle kam es schliesslich zur Gangrän und zur Amputation des Beines.

3. Die bei der Beckenchirurgie vorkommenden Gefässverletzungen, ihre Komplikationen und ihre Behandlung werden erörtert.

4. Die möglichen Einflüsse der Entfernung gewisser Organe und Gewebe des kleinen Beckens auf die anastomosierenden Systeme und auf den Kollateralkreislauf im Gebiet des Beckens und der Beine werden beschrieben.

5. Es wird der Gedanke ausgedrückt, dass Schmerzen im Gebiete des Beckens und der Beine bei Krebskranken nicht nur durch den Druck und das Eindringen des bösartigen Gewebes sondern auch durch chronischen Gefässverschluss entstehen könnten. Darin wird ein zusätzlicher Grund zur Beseitigung des krebsigen Gewebes gesehen, das den Blutgefässen des Beckens anhaftet oder einen Druck auf sie ausübt.

RIASSUNTO

1. Gli interventi radicali per i cancri della pelvi interessano anche i vasi pelvici e quelli degli arti inferiori.

2. A titolo illustrativo vengono presentati 2 casi in cui la dissezione del tumore a ridosso dei vasi determinò la comparsa di un grave vasospasmo, che, in uno, condusse fino alla gangrena e all'amputazione di un arto.

3. Vengono pertanto discusse le lesioni vascolari e le relative complicanze nella chirurgia pelvica.

4. Vengono descritte le conseguenze dell'ablazione di organi e tessuti pelvici

sul circolo anastomotico e sui vasi collaterali.

5. Si prospetta l'ipotesi che certi dolori pelvici e degli arti inferiori, in pazienti con carcinoma del piccolo bacino, siano dovuti all'occlusione vascolare piuttosto che alla compressione e alla invasione da parte del tumore. Questo può essere un ulteriore incentivo alla rimozione di neoplasmi aderenti o comprimenti i vasi pelvici.

RESUMEN

1. Se muestra que la operación radical del cáncer pélvico debe incluír los grandes vasos de la pelvis y la vascularización de la pierna.

2. Se describen dos casos ilustrativos, en los cuales, la disección de los grandes vasos dió lugar a espasmo marcado, en uno de los dos casos se produjo gangrena y amputación de la pierna.

3. Se discuten las lesiones vasculares de la cirugía pélvica, sus complicaciones y tratamiento.

4. Se describen los posibles efectos de la extirpación de ciertos órganos pélvicos sobre sistemas anastomosantes y conductos colaterales de la pelvis y piernas.

5. Se sugiere que el dolor pélvico y de las piernas en los pacientes con cáncer se debe no únicamente a la invasión por tejido maligno, sino a la obstrucción vascular crónica. Esto debe sumarse como una razón para atacar tejido maligno adyacente a los vasos pélvicos.

RÉSUMÉ

1. Il est montré que le domaine de l'opération radicale du cancer pelvien comprend les gros vaisseaux sanguins du pelvis et l'apport sanguin de la jambe.

2. A titre d'exemple, deux cas sont décrits où la dissection autour des gros vaisseaux sanguins aboutit à un vasospasme sévère, grave et imprévu, avec gangrène définitive et amputation d'une jambe dans un des deux cas.

3. Les dégâts vasculaires en chirurgie pelvienne, leurs complications et leur traitement sont discutés.

4. L'effet possible de l'ablation de certains organes pelviens et du tissu sur les systèmes anastomotiques et canaux collatéraux du pelvis et des jambes est décrit.

5. Il est suggéré que la douleur de la région pelvienne et des jambes, chez des cancéreux, serait due non seulement à la pression et l'envahissement par le tissu malin, mais à l'obstruction vasculaire chronique. Se qui constituerait une raison supplémentaire d'attaquer le tissue malin qui adhère aux vaisseaux sanguins pelviens ou les comprime.

SUMARIO

1. O campo da operação radical para o câncer pélvico inclui os grandes vasos sanguíneos da pelvis e a irrigação sanguínea da perna.

2. Para fins de ilustração dois casos são descritos, nos quais a discussão en tôrno dos grandes vasos sanguíneos levou a um espasmo vascular grave e surpreendente, e num dêsses casos com gangrena e amputação de uma perna.

3. São discutidas lesões vasculares na cirurgia pélvica, suas complicações e tratamento.

4. É descrito o possível efeito da retirada de certos órgãos e tecidos pélvicos sôbre os sistemas de anastomose e canais colaterais em tôrno da bacia e pernas.

5. Sugere-se que a dôr na bacia e pernas nos pacientes com câncer pode ser devida não apenas à pressão e invasão por tecido maligno como também a obstrução vascular crônica. Esta pode ser mais uma razão para o ataque ao tecido maligno ligado aos vasos sanguíneos pélvicos ou fazendo pressão sôbre os

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Philosophy is not a mere collection of noble sentiments. A deluge of such sentiments does more harm than good . . . It is not—or, at least, should not be—a ferocious debate between irritable professors. It is a survey of possibilities and their comparison with actualities. In philospohy, the fact, the theory, the alternatives, and the ideal, are weighed together. Its gifts are insight and foresight, and a sense of the worth of life, in short, that sense of importance which nerves all civilized effort. Mankind can flourish in the lower stages of life with merely barbaric flashes of thought. But when civilization culminates, the absence of a co-ordinating philosophy of life, spread throughout the community, spells decadence, boredom, and the slackening of effort.

Philosophy is the welding of imagination and common sense into a restraint upon specialists, and also into an enlargement of their imaginations. By providing the generic notions philosophy should make it easier to conceive the infinite variety of specific instances which rest unrealized in the womb of nature.

—Whitehead

Cancer — A Public Health Problem

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IN 1938, soon after its establishment in the Public Health Service, the National Cancer Institute initiated studies of morbidity from cancer in ten metropolitan areas in order to obtain information on the size and nature of the cancer problem in the United States.[1] The areas selected for study were Chicago, Detroit, Philadelphia, Pittsburgh, Atlanta, Birmingham, Dallas, New Orleans, Denver and San Francisco. The same areas were resurveyed in 1948 to obtain current information and to determine what changes had taken place during the ten-year interval. Data were obtained on virtually all cancer patients treated or under observation for any malignant growth during 1937 and 1947. Separate reports have been issued on each of the ten areas,[2] and a summary report is being prepared.[3]

The surveys indicate that in the United States cancer morbidity has increased even more than has cancer mortality. In 1947, among residents of the ten cities, the incidence of cancer was 30 per cent higher than in 1937, the prevalence rate 26 per cent higher and the mortality rate 19 per cent higher. After adjustments for the changed age composition of the population, the increases remain substantial; 3 per cent for mortality, 10 per cent for prevalence and 14 per cent for incidence. The relatively small increase in mortality is somewhat encouraging.

The surveys indicate also that the magnitude of the cancer problem in the United States may be expected to continue to increase for years to come. Estimates of the number of cases of newly diagnosed cancer, cases under treatment, and deaths for 1950, and forecasts of these numbers for future years, 1955 to 1975, are presented in Figure 1. Further estimates show that 1 out of 3 persons in the United States will have cancer in their lifetime. Probabilities for selected intervals of the life span are depicted in Figure 2. The magnitude of risks for old persons is most striking. One of 8 persons alive at the age of 65 may be expected to have cancer within ten years, and 1 of 4 may acquire it during the remaining lifetime. These figures point up the importance of physicians' being especially alert for symptoms of cancer in elderly patients.

While the incidence of cancer is essentially the same in the two sexes, there is a marked difference in the distribution of cancer by site of origin. The 1947 surveys show that in the female nearly one-half of all cancers originate in the reproductive organs (breast and genitals) and nearly one-fourth in the digestive system. In the male about one-eighth of all cancers originate in the reproductive organs, but one-third start in the digestive system. Twelve per cent of cancers in male patients originate in the respiratory system, but only 3 per cent of cancers in female patients originate there. The buccal cavity is the primary site of 2 per cent of the cancers in the female and 6 per cent of those in the male. The skin is the site of 11 per cent of all cancers in the female, 15 per cent in the male.

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

For several site groups, the relation between the changes in incidence and mortality rates from 1937 to 1947 suggests that progress has been made in the management of cases of diagnosed cancer. The incidence of cancer of the female genitals in the ten metropolitan areas did not change, but the mortality due to this form of cancer declined 10 per cent. For both sexes, the incidence of cancer of the digestive system was unchanged, but the mortality went down 8 per cent. The incidence of cancer of the urinary organs increased 10 per cent, while its mortality rate declined 8 per cent. The incidence of cancer of the male genitals increased 16 per cent: the mortality from cancer at this site declined 2 per cent. Cancer of the buccal cavity, for both sexes, showed an increase of 16 per cent in incidence and 2 per cent in mortality.

Data collected in the ten metropolitan areas showed a decrease of 24 per cent in the incidence of cancer of the stomach. This decrease, however, may be more apparent than real. While the incidence of gastric cancer has decreased, the incidence of cancer of other parts of the digestive system has increased. Thus, an interchange may have occurred in classifying cancers originating in the digestive system.

In addition to information on the distribution of different forms of cancer in the population, the surveys provide evidence of improvement in medical care of persons with cancer. For the 10 areas combined, the number of cases of cancer reported by hospitals was 7 per cent greater in 1947 than in 1937. Since medical facilities are generally more comprehensive in a hospital than in a physician's office, the increase in cases reported by hospitals can be taken as one indication of improvement in the quality of medical care received by these patients. In 72 of every 100 cases of cancer discovered in the survey areas during 1947, the diagnosis was confirmed by microscopic examination of tissue as compared to 61 of every 100 in 1937. The increase of 18 per cent in the proportion of microscopically confirmed diagnoses is another indication of improvement in the medical care given to patients with cancer.

One-half of all cancers develop in these sites, accessible to direct examination by the physician: the mouth and pharynx, the thyroid, the breast, the skin, the prostate, the uterus and the rectum. Yet surveys of the ten metropolitan areas in 1947 revealed that, excluding cancer of the skin, only 50 per cent of the cancers developing in accessible sites are discovered in an early stage. In view of the evident benefits of early diagnosis, this is an unfortunate showing. Follow-up data drawn from the cancer register maintained since 1935 by the Connecticut State Department of Health[4] show that 43 per cent of the persons whose cancers were diagnosed while localized lived for at least five years after the diagnosis, but only 3 per cent of those whose condition was diagnosed after regional involvement or remote metastases had occurred survived five years.

The doctrine that early diagnosis offers the most hope for successful treatment has been the principal theme of the Government's efforts to improve case-finding and the efforts of the American Cancer Society and cooperating groups. Educational programs to alert the public and aid the physician in the diagnosis and treatment of cancer are yielding good dividends. Education alone, however, is not enough. Urgently needed to ease the case-finding burden are practicable screening methods.

The ideal solution to this problem would be a simple, inexpensive and accurate chemical or serologic test that could be applied on a mass basis. In a program centered on this problem, several university groups, sponsored by the National Cancer Institute, are conducting rigid evaluation of proposed tests as well as developing new ones. Much fruitful work has been done and reported in the literature.[5] Most of this research has been related to a general test for cancer based upon serologic principles.

At the same time, considerable progress has been made in the development of tests *for detecting cancer in specific sites.* The best known and most useful of these is the cytologic or cell smear examination developed mainly by Papanicolaou. Although the cytologic test is theoretically applicable to any of the body excretions, it is used mostly as an aid to the diagnosis of cancer of the uterine cervix, the stomach and the lung.

The greatest life-saving potential of exfoliative cytology seems to be as an aid in the detection of early cervical cancer. For further evaluation of this technic, the Department is engaged with the University of Tennessee College of Medicine in the application of vaginal cytologic tests in a mass screening program for uterine cancer in Memphis and Shelby County.[6] The results at the time of writing are very encouraging. Since the inauguration of the program in July 1952, smears from 72,000 women have been examined. This number represents approximately 45 per cent of the adult female population in the area and speaks well for community acceptance of the screening program. Professional acceptance is evidenced by the fact that one-half of the smears now coming into the laboratory are submitted by individual physicians; the others originate in various clinics.

The cytologic observations were "suspicious" or "positive" on 1 per cent (1,157) of the first 60,000 women screened. Biopsies were completed in 912 cases (79 per cent of the 1,157 recommended). The results of biopsy were positive in 51 per cent of the cases; borderline, suspicious, or inconclusive in 16 per cent, and negative in 33 per cent. The vaginal cytologic procedures resulted in only one-half of 1 per cent false positives (296 + 60,000).

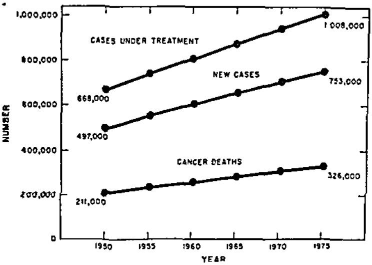

Fig. 1.—Estimated number of cases of cancer and deaths from cancer in the United States, 1950-1975.

	BEGINNING AT		
	BIRTH	AGE 45	AGE 65
BY AGE 20	0.3	...	..
BY AGE 45	3	.	...
BY AGE 65	14	13	..
BY AGE 75	23	23	13
DURING FUTURE LIFETIME	32	32	26

Fig. 2.—Percentage of persons in varying age groups in whom cancer may be expected to develop.

From the point of view of cancer control it is significant that of the 241 confirmed intraepithelial carcinomas 90 per cent were unsuspected prior to the cytologic test, and of the 209 confirmed invasive uterine cancers 29 per cent were unsuspected. It is particularly significant that, on the average, the women with intraepithelial carcinoma were twenty years younger than were the women with invasive cancer of the uterus. This project will be continued long enough to determine the incidence of intraepithelial carcinoma and its relation to the incidence of invasive

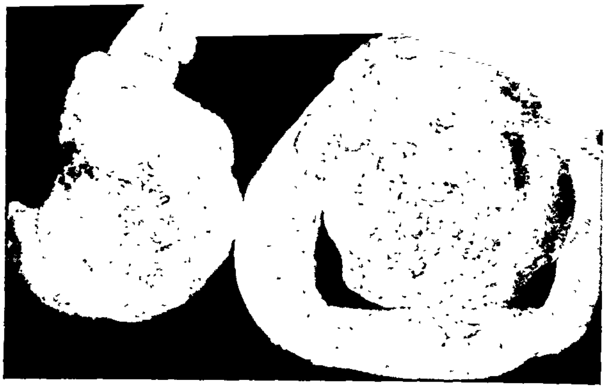

Fig. 1 (Case 1).—Pneumatosis cystoides intestinalis of the jejunum. The two masses were composed of a network of cysts containing gas. They involved the entire circumference of the intestine.

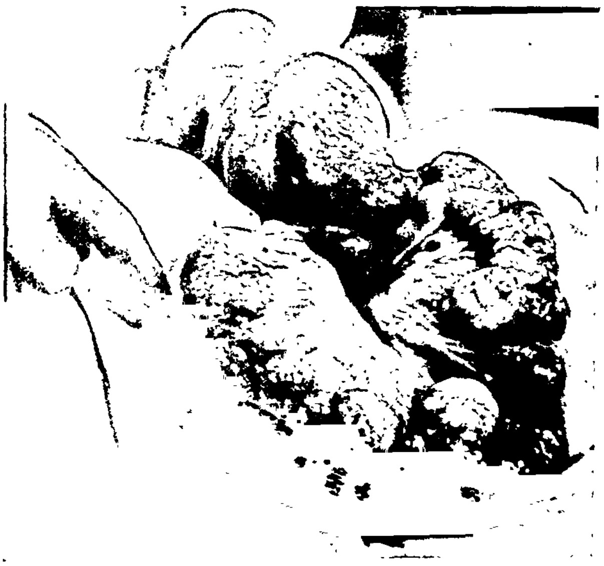

Fig. 2 (Case 1).—Multiple cystic pneumatosis of the small bowel. The cysts were present from the proximal jejunum to the terminal ileum.

smooth. On palpation they are crepitant and moderately compressible.

"The bowel specimens were opened by incising along the lumen. The mucosa is smooth throughout, without ulceration or fistula formation. The cut surfaces of the masses present a honey-combed appearance, with numerous cystic spaces that lie in close apposition to each other and vary from 0.2 to 1.5 cm. in diameter. These spaces have a smooth lining and are empty.

"Sections through the bowel and masses present mild inflammation of the mucosa, but there is no evidence of ulceration, and the exudative cells are primarily lymphocytes. The major observation is the presence of numerous cystic spaces that lie in the submucosa, muscularis and subserosal layers. These cysts do not possess an epithelial lining, but they are lined by macrophages; many of these have formed syncytium-like giant cells. Where the macrophages are not present, the wall consists merely of a thin layer of compressed fibrous tissue. The surrounding stroma shows some lymphocytic exudation, but there is no neoplastic change."

About one year later the patient was again attacked by abdominal pain, nausea and vomiting. A diagnosis of acute obstruction was made and immediate operation performed. Exploration revealed an obstruction of the small bowel, due to torsion of the bowel on its mesentery. Along the mesenteric border, from the duodenum to the cecal junction, were numerous cysts varying in diameter from 2 mm. to 3 cm. (Fig. 2). The cysts were filled with gas, and their walls were much thicker than the normal mesentery. Pressure on some of the larger cysts deflated them, and a corresponding inflation of the associated small bowel was observed, indicating that the lumen of the cyst was connected with the lumen of the small bowel. Release of the torsion relieved the obstruction and nothing further was done. The patient has had no symptoms since. At the time of writing he is now 87 years old and is alert and active. A flat plate of the abdomen in September 1954 showed no abnormalities.

Case 2.—This case, in view of its unusual nature, will be reported in some detail. A white man aged 40 was admitted to the hospital on April 14, 1953, complaining chiefly of diarrhea. This had developed two months earlier, with five or six stools a day containing bloody, mucoid material. Mild abdominal cramps accompanied the diarrhea. There was nausea when the cramps were severe, but no vomiting.

History.—The patient had undergone appendectomy in 1939. His left leg had been broken by the kick of a horse in 1935. His father had died of carcinoma of the colon in 1935; his mother, three brothers and five sisters were living and well. The patient was married and had 6 children. He was employed as an ordnance inspector at a Government plant.

Examination.—A systemic review gave essentially negative results except for the symptoms of the present illness. Sigmoidoscopic examination revealed two or three sessile elevations of the mucous membrane, which were thought to be atypical adenomas. A biopsy specimen was taken, but the slides showed normal mucous membrane. A barium enema, however, was reported as indicating severe polyposis of the descending and sigmoid colon, and the patient was immediately prepared for operation.

Operation.—No pathologic process was observed in the abdomen except in the distal segments of the large bowel. Here, low in the descending and sigmoid colon, numerous small indurated areas were palpable. These were assumed to be adenomas. A sigmoidoscope was inserted into the ascending colon and the transverse colon through small incisions, and no abnormalities were noted. The mesentery associated with the involved colon contained several small foamy bubbles like soap suds. The descending colon and sigmoid were resected and an end-to-end anastomosis performed (Fig. 3). The patient was discharged on the ninth postoperative day and has had no further complaints.

Pathologic Report (Dr. John Carlquist).—"The specimen consists of a segment of large bowel that measures 37 cm. in length and 12.5 cm. in average circumference. The serosa is congested and shows focal hemorrhages. The mucosa is normal in appearance for a distance of 4 cm. at one end of the specimen; the other end presents a normal zone 11 cm. in length. The intervening mucosa has a "cobbled" appearance and is elevated in a domed pattern, the hemispherical elevations measuring up to 1.5 cm. in diameter. They lie in close contact with each other, with very little intervening normal mucosa. The mucosa is generally congested, more markedly so over the apex of the elevations, but it is not ulcerated. There are no true polypi (Fig. 4) or evidence of neoplasm. On section, the elevated mucosa overlies empty cystic spaces. These are present in great numbers and appear confined to the submucosa.

"Microscopic studies show numerous cystic spaces; they are largely in the submucosa but extend into the longitudinal muscle and serosa in some areas. The cystic spaces are variable

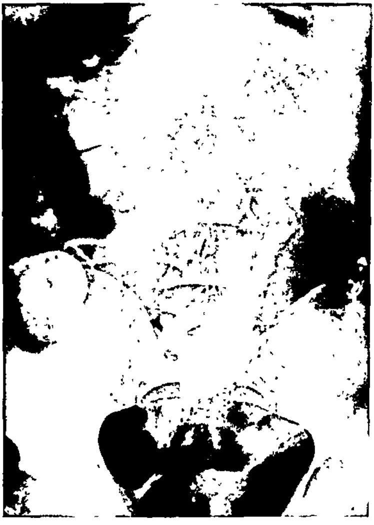

Fig. 3 (Case 2).—Barium enema roentgen examination of cystic pneumatosis of the colon. Diagnosis of polyposis of descending colon was made.

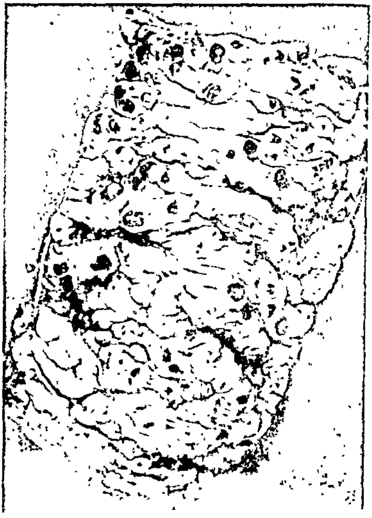

Fig. 4 (Case 2).—A r
colon. The hemorrhagic
elevations gave the a

in size and shape; the larger ones apparently represent a confluence of smaller cysts, as segments of ruptured walls project into the lumen in an irregular fashion. The cysts possess no epithelial lining; their walls consist only of a thin fibrous layer with an inner lining of giant cells and monocytes. In some of the cysts the giant cells have assumed a syncytial structure. More peripheral to the cysts, the tissue shows a chronic inflammatory reaction with fibrosis. The exudate consists of lymphocytes, monocytes and an occasional foreign body giant cell. The mucosa is thinned over the surface of the major cysts but is not ulcerated.

"In other segments there are foci that represent the earliest development of this cystic process. The stroma is separated in an irregular fashion about large accumulations of giant cells resembling those lining the actual cysts."

Historical Review.—The striking pathologic observations associated with this disease attracted the attention of investigators two hundred years ago. According to Nitch,[4d] the oldest specimen on record is in the catalog of Ruysch's Anatomical Museum, dated 1737 and listed as "a portion of jejunum of a man showing a tumor which arose from wind when the external tunic was slightly injured." Du Vernoi[5] was apparently the first to describe the disease at autopsy in 1730-1731. Haller[6] followed with a case in 1756. Bang[7] in 1876, described a case in considerable detail and gave the disease the name "pneumatosis cystoides intestinalis hominis." Hahn[8] in 1899 was the first to describe the disease after surgical treatment of the living. In America, the first case was described by Finney[9] in 1908. The first preoperative roentgenologic diagnosis was made by Baumann-Schenger[4a] in 1939.

Investigators have known for many years that an analagous condition occurs quite commonly in swine. As early as 1837 this disease attracted the attention of such intellectual giants as John Hunter, Cavendish and Jenner. It was Jenner who sent the specimen to Hunter for his museum. The gas in the cysts was analyzed by Cavendish, who reported that the cysts contained "a little fixed air (which was carbon dioxide) and the remainder not at all inflammable (inflammable air was hydrogen) and almost completely phlogistigated" (phlogistigated air was nitrogen). In 1938 Eveleth and Biester[10] produced the disease experimentally in hogs by feeding them polished rice.

Etiologic Factors.—Several theories have been proposed to explain the causation of this disease. Some of these have failed to survive the critical investigation of pathology, bacteriology and biochemistry as these sciences matured. Some of the early writers considered the lesion a neoplasm,[10] but no neoplasms as they are now understood have been identified. Some thought the gas to be the result of putrefaction, but no putrefaction has been revealed. Some attributed the gas to gas-forming bacilli, but it is unusual to find bacilli in the cysts, and those that have been cultured are not of the gas-forming variety. Nor does analysis of the gas produce results consistent with those normally produced by these bacilli.

Of the theories that have survived, none is completely satisfactory in explaining the pathogenesis of this strange condition. The aforementioned production of an analagous disease in hogs by feeding them polished rice has stimulated interest in the possibility that the disease may be related to vitamin deficiency. In support of this possibility is the fact that in a large percentage of the reported cases an associated gastrointestinal lesion was present that may have interfered with the patient's normal nutrition.

A chemical theory proposed by Masson[12] postulated that fermentation in the intestine could change the bowel *Ph* from the alkaline to the acid side. This, he suggested, could release the normally soluble carbon dioxide in the lymphatics as gas bubbles, producing embolic effects that would prevent further absorption of the gas. This theory has obtained little support from other investigators but, as Creese[1] has emphasized, it has not been disproved.

The mechanical theory assumes that intestinal gas passes through the bowel wall through some kind of defect in the mucosa. Occasionally a defect has been demonstrated. Bubus and Swanbeck[13] observed a definite ulcer at the base of the appendix, which they presumed to be the portal of exit for the gas. Stiennon[14] postulated that the gas escaped through a peptic ulcer and found its way retroperitoneally to the mesentery and bowel. Tung and Nagia,[15] while operating on a patient with this disease associated with stenosing peptic ulcer, observed that, when the patient vomited, the cysts along the mesenteric border swelled, without simultaneous distention of the intestine. In Case 1 here presented it was demonstrated at operation that some of the cysts did have a patent connection with the lumen of the small bowel, a fact that lends added support to the mechanical theory as to the origin of the cysts.

COMMENT

The source of the extraluminal gas in these cases has been the topic of much speculation and theorization. In Case 1 the same defect that allowed gas to escape from the lumen must have also allowed the escape of intestinal juices. Why didn't the succus entericus, normally so irritating outside the confines of the intestinal lumen, produce an intense inflammatory reaction? Other questions also present themselves. In a case of ulcerative colitis in which the mucosa is definitely damaged, why doesn't a similar emphysema of the surrounding tissues develop? In those cases in which no mucosal defect is demonstrable, what is the source of the gas? These questions remain unanswered.

In Case 2 the interesting feature is the location of the disease. No associated disease was demonstrable in the colon, the intestinal tract or any other organ. There is no explanation as to why the disease selected this unusual area in this particular case.

The symptoms, diarrhea and abdominal cramps, were completely alleviated by resection of the involved portion of the colon. This suggests that in this case, at least, removal of the pathologic tissue was the treatment of choice.

In Case 1 resection was necessary to relieve the obstruction. Other surgeons have reported similar experiences. (Thoma and Henniger[15] reported the death of a patient from intestinal obstruction due to pneumatosis intestinalis.) After the second operation, however, the numerous small cysts disappeared spontaneously when the torsion of the bowel was relieved. This coincides with the observations of others and suggests that, if conservative treatment can be applied in the form of correction of the primary disease, the cysts will apparently subside spontaneously.

SUMMARY

A case of pneumatosis cystoides of the small bowel is presented, as demonstrating the following points:

1. The cysts showed definite confluence with the lumen of the small bowel, which tends to support the mechanical theory of the cause of this disease.

2. If the cystic lesion produces obstruction of the bowel, the involved area should probably be resected. If the cysts are secondary to an associated pathologic process and are themselves relatively asymptomatic, correction of the primary disease may result in spontaneous regression of the cysts.

A case of pneumatosis cystoides of the descending and sigmoid portions of the colon is also presented. The site of this condition is unique, as far as can be determined from the reports in the available literature.

ZUSAMMENFASSUNG

Es wird ueber einen Fall von Pneumatoss cystoides des Duenndarms berichtet, an Hand dessen es zu den folgenden Feststellungen kommt:

1. Die Zysten zeigten eine einwandfreie Verbindung mit dem Hohlraum des Duenndarms, was die mechanische Theorie der Krankheitsursache zu unterstuetzen neigt.

2. Fuehrt die zystische Erkrankung zum Verschluss des Darmes, sollte wahrscheinlich das befallene Gebiet reseziert werden. Stellen die Zysten sekundaere Erscheinungen eines gleichzeitig bestehenden Krankheitsprozesses dar, ohne von sich aus erhebliche Symptome hervorzurufen, so duerfte die Behebung der primaeren Erkrankung zur spontanen Rueckbildung der Zysten fuehren.

Es wird ferner ein Fall von Pneumatosis cystoides des Colon descendens und sigmoideum vorgestellt. Soweit sich aus den Berichten des verfuegbaren Schrifttums feststellen laesst, handelt es sich hier um eine einzigartige Lokalisierung der Erkrankung.

SUMARIO

É apresentado um caso de pneumatosis cystoides no intestino delgado, demonstrando-se os seguintes pontos: 1. o cistos apresentavam confluência definida com a luz do intestino delgado, o que tende a dar apôio à teoria mecânica da causa desta afecção: 2. se a lesão cística produz obstrução do intestino, a área comprometida deve ser provàvelmente ressecada. Se os cistos são secundários a um processo patológico associado, sendo êles mesmos relativamente assintomáticos, a correção da afrecção primária pode acarretar a regressão espontânea dos cistos.

É ainda apresentado um caso de pneumatose cistóide do colo descendente e sigmóide. Tal localização desta afecção é unica, até onde pode ser verificado pela revisão da literatura.

RÉSUMÉ

Un cas de pneumatose pseudokystique de l'intestin grêle est présenté, qui met en évidence les points suivants:

1. Les kystes montrent une confluence nette vers la lumière de l'intestin grêle, ce qui tend à donner raison à la théorie mécanique de l'origine de cette affection.

2. Si la lésion kystique provoque une obstruction intestinale, il faudrait probablement réséquer les zones environnantes. Si les kystes sont secondaires à un processus pathologique associé et qu'ils sont eux-mêmes relativement asymptomatiques, une thérapeutique de l'affection primaire peut amener la régression spontanée des kystes.

L'auteur présente encore un cas de pneumatose pseudokystique des portions descendante et sigmoïdienne du colon. Cette localisation est unique, pour autant qu'on en puisse juger d'après la littérature.

RESUMEN

Se presenta un caso de pneumatosis quística del intestino delgado, demostrándose los puntos siguientes:

1. Los quístes muestran confluencia definida con la luz del intestino delgado, lo que tiende a apoyar la teoría mecánica de esta enfermedad.

2. Si la lesión quística produce obstrucción intestinal, debe hacerse resección del área afectada. Si los quistes son secundarios a un proceso patológico y son relati-

vamente asintomáticos, la corrección del padecimiento primario puede producir la regresión espontánea de los quístes.

Se presenta también un caso de pneumatosis quística del colon descendente y sigmoide. El sitio del padecimiento es único, como puede ser determinado por las comunicaciones en la literatura.

RIASSUNTO

Viene descritto un caso di pneumatosi cistica del tenue, con le seguenti caratteristiche:

1. Le cisti tenderanno a confluire nel lume intestinale; questo dato rappresenta una conferma alla teoria della genesi meccanica.

2. Se le cisti producono occlusione intestinale, è necessario resecare il segmento interessato; se invece sono secondarie ad altra affezione e sono relativamente asintomatiche, la cura della malattia principale condurrà alla regressione di esse.

Viene descritto anche un caso di pneumatosi cistica del colon discendebte e del sigma.

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Order is the sanity of the mind, the health of the body, the peace of the city, the security of the state. As the beams to a house, as the bones to the microcosm of man, so is order to all things.

—*Southey*

Leiomyosarcoma of the Jejunum

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MALIGNANT disease of the small intestine is not too common. The reported incidence of malignant tumors of the small bowel, according to several authors, is 1 to 6 per cent,[1] of all gastrointestinal malignant tumors, leiomyosarcoma being the rarest.[2] Warren[3] reported that, among 26 primary malignant tumors of the small intestine, he encountered only 1 leiomyosarcoma. The diagnosis of this tumor is most difficult[4] in the absence of obstruction and is usually made at laparotomy.[5]

REPORT OF CASE

A. C., a married white woman aged 49, was admitted to the care of one of us (J. A. R.) on March 20, 1950, because of thrombophlebitis of the right leg. She had no recollection of childhood diseases. She had undergone two cesarean sections, in 1934 and 1938 respectively. Appendectomy and removal of a right ovarian cyst had been done twenty-five years earlier. She had had pleurisy at approximately the same time, and gastrointestinal hemorrhage had occurred two years prior to her admission. The family history was irrelevant.

At this time the patient was treated conservatively, and the thrombophlebitis improved.

On June 30, 1950, she reported a black, tarry stool after a chill and pain in both arms. The value for hemoglobin was 8 Gm. On July 23 she was seen for acute abdominal pain and distention. Intestinal obstruction was suspected, and the patient was hospitalized. The value for hemoglobin was 10.5 Gm.; the red blood cells numbered 3,680,000 per cubic millimeter; the stool contained occult blood, and an electrocardiogram was within normal limits. A barium enema study revealed narrowing between the cecum and the ascending colon. A preoperative diagnosis of carcinoma of the cecum was made. On August 2 an abdominal exploratory operation was done. Adhesions in the region of the cecum and ascending colon accounted for the roentgen deformity; no tumor was discovered. Except for the adhesions, inspection of the entire gastrointestinal tract showed no abnormality. An umbilical hernioplasty was performed at this time for a small umbilical hernia, and bilateral ligations of the saphenous vein and the superficial femoral vein were done because of the thrombophlebitis. The patient was discharged from the hospital on August 12.

On November 18 she was seen again for a sudden, sharp pain, aggravated by motion, in the right lower abdominal quadrant. In the interim since the operation she had been well, having two or three bowel movements daily. The stool now gave a negative reaction for occult blood. Tenderness was present in the right upper quadrant only, just above and to the right of the umbilical area. This was relieved by novatrin and phenobarbital.

On May 7, 1951, in addition to dark stools, the patient complained of cramping and pain in the left flank. The stool revealed occult blood, and the value for hemoglobin was 8.7 Gm. Cramping continued for one month, with no decrease in hemoglobin, although the stool continued to yield chemically positive results for occult blood. The patient refused hospitalization and was treated with banthine. On November 17 she again reported tarry stools, as well as shortness of breath. There was a loss of 20 pounds (9.1 Kg.) in weight, and the value for hemoglobin was 7 Gm. Hospitalization was again refused.

On Jan. 21, 1952, the patient was admitted to the hospital complaining of intermittent pain in the abdomen and the back. The pulse was feeble and the blood pressure low. She stated that there had been several tarry stools since November 1951. Laboratory and roentgen studies were made. The value for hemoglobin was 6 Gm.; the red blood cell count was 2,300,000 per cubic millimeter; the platelets numbered 127,000. The hematocrit reading was 20 and the bleeding time forty-seven seconds. Clot retraction was complete in one hour. The prothrombin time was fourteen seconds (control, fourteen seconds). The stools gave a positive reaction for occult blood. Gastrointestinal and barium enema studies revealed no abnormality. After having been given 7 pints of blood the patient was discharged on February 14.

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[†] Deceased.

Submitted for publication Oct. 21, 1954.

In March the gastrointestinal and barium enema studies were repeated. We did not concur with the roentgenologist's report of a prepyloric ulcer, and we so informed the patient. The barium enema study gave negative results. On June 13, after a recurrence of symptoms, the patient was advised to permit a laparotomy; however, she chose to visit a New York internist and surgeon, who, after another gastrointestinal study, made a diagnosis of duodenal ulcer—not on the basis of an ulcer niche but because of the history and duodenal irritability. Operation was advised, but the patient refused because the diagnosis was indefinite.

On September 2 a gastrointestinal study, including, as had all previous studies, a study of the small intestine and a barium enema, revealed no abnormality. After this the patient was seen on two occasions. The value for hemoglobin was 7 Gm.; the stools contained occult blood. The patient weighed 172 pounds (78 Kg.). On April 11, 1953, she consented to undergo surgical investigation. Except for active phlebitis of the right leg, physical examination revealed nothing significant. The erythrocyte count per cubic millimeter of blood was 3,020,000, with 7 Gm. of hemoglobin; the leukocyte count was 6,500, with a normal differential count. The hematocrit reading was 26. Chemical examination of the blood revealed 13 mg. of urea nitrogen, 82 mg. of sugar and 700 mg. of chlorides per hundred cubic centimeters. The patient was given a transfusion, and a laparotomy was performed on April 24.

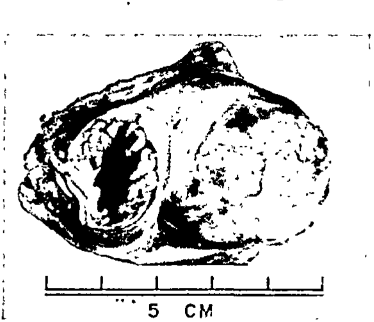

Fig. 1.—Excised jejunum with tumor mass.

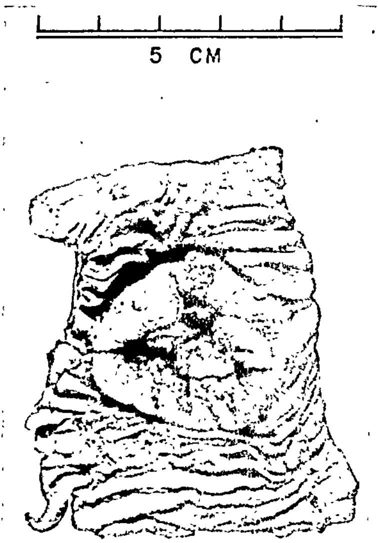

Fig. 2.—Ulceration of intestinal mucosa, with raised and hard edges.

Preoperatively the red blood cell count was 4,020,000 per cubic millimeter, with 80 per cent hemoglobin. On exploration of the abdomen many adhesions were observed, involving the omentum, intestines, uterus and bladder. A tumor was present, extending from the mesentery of the jejunum inward to the serosa and ulcerating the mucosa. It measured about 4.5 cm. in diameter and was located about 36 inches (91.4 cm.) from the ligament of Treitz. The edges of the ulcer were raised

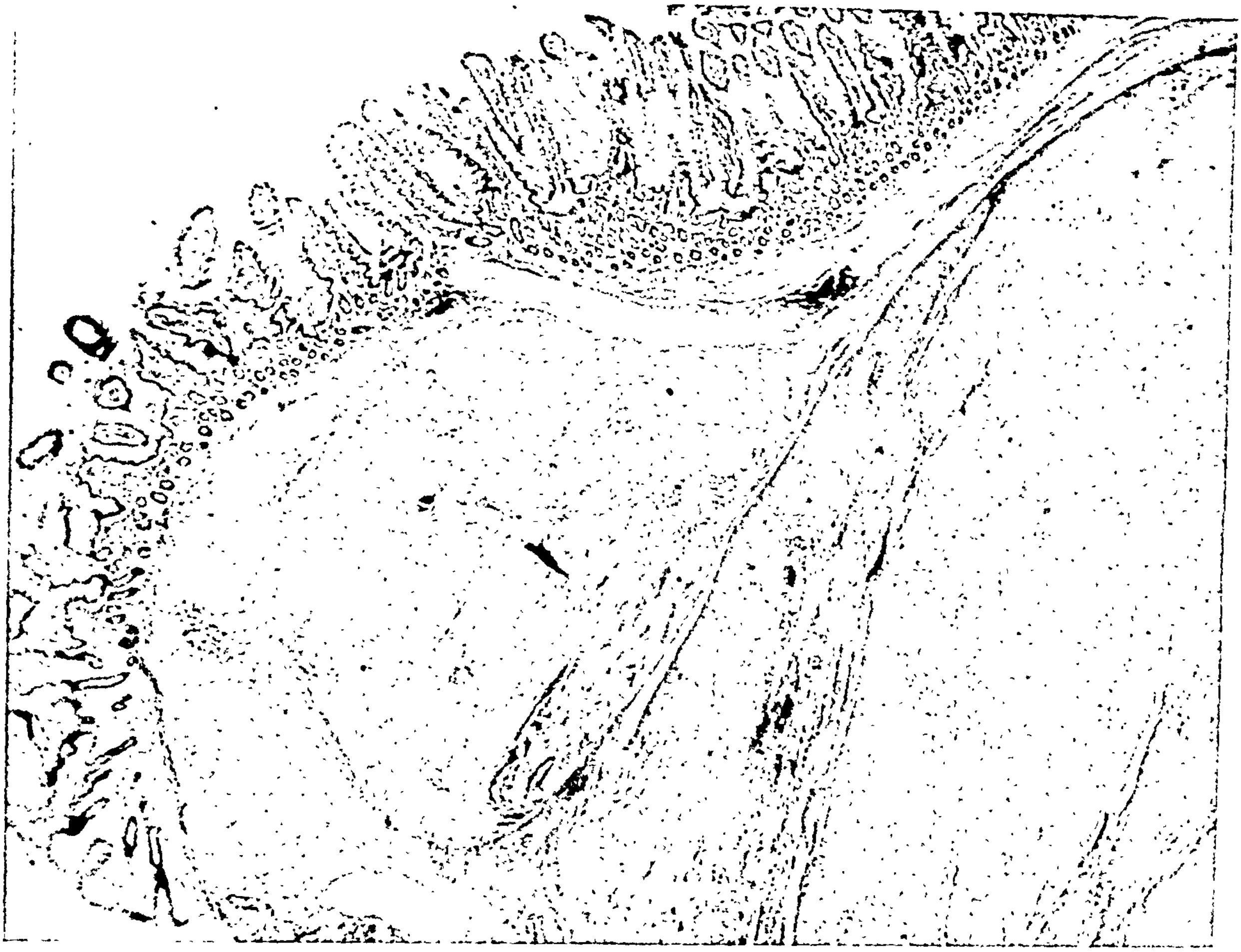

Fig. 3.—Low power photomicrograph showing intestinal muscle involved.

and hard. No involvement of local glands could be detected. The remainder of the small intestine and colon presented no abnormality. There was no involvement of the liver. The uterus and ovaries were normal. Resection of the affected portion of the jejunum was performed, and an end-to-end anastomosis was done by an open technic.

The removed specimen consisted of a portion of small bowel measuring 7 by 2.5 cm. At about the midportion of the bowel there was a protuberance which extended into the mesentery and penetrated it to a depth of 4 cm. This protuberance measured 4 by 3 by 3 cm. It was covered by a thin capsule beneath which frank blood was visible. This mass was solid and fairly firm. The intestine was open, and an ulcerated lesion was present at the midportion, measuring 4 cm. in length and 2.5 cm. in width. The edges of the ulcerated lesion were markedly indurated and elevated above the level of the surrounding tissue. The remaining mucosa showed normal intestinal folds. The ulcerated area was raw and granular. On section through the mass, the color of the tumor was gray to tan yellow. Hemorrhages were observed in the center of the tumor mass.

Microscopic examination revealed a mucosal surface that appeared ulcerated for a considerable distance; on either end there was normal appearing mucosal tissue. The latter showed numerous glandular structures lined by tall goblet cells. The stroma was infiltrated with plasma and lymphocytic cells, as well as an occasional eosinophil. Beneath the mucosa there was a very dense fibrous tissue capsule, underneath which was compact tumor tissue. This was composed of muscle cells forming elongated bands and also forming small groups or clusters of cells. These all appeared to have fairly uniform staining qualities; the cell structure was elongated and the nuclei oval. The nuclei contained nucleoli. Occasionally, some of the nuclei took on a much darker stain. Many of the nuclei appeared elongated, and others appeared fragmented. There was considerable round cell infiltration. There were also numerous plasma cells and new blood vessels.

The muscle cells were undergoing varying degrees of necrobiosis. Another section, taken through the tumor proper, showed a fairly average arrangement of elongated muscle tissue cells and also cross sections of these cells, represented by small nuclei with vacuolated cytoplasm. In the elongated muscle tissue cells the nuclei appeared fairly close to average. They showed polar bodies at either end. The cytoplasm was pink-staining eosinophilic material. The nuclei were occasionally larger than one would expect.

Since leaving the hospital the patient has had no symptoms of intestinal hemorrhage and is enjoying a normal life.

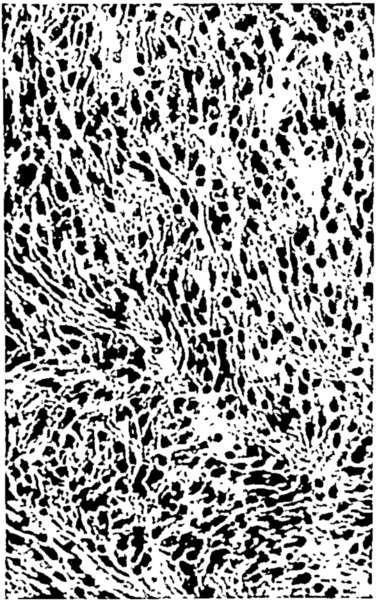

Fig. 4.—High power photomicrograph showing tumor cells replacing the muscle layer.

COMMENT

Generally, the diagnosis of jejunal malignancy is made at operation or necropsy.[1a] A malignant lesion may be suspected from the symptoms and laboratory findings. The roentgenologic studies will not visualize the lesion in the early stage and when it is visualized the tumor is inoperable.[1c]

CONCLUSION

1. Leiomyosarcoma of the jejunum is very rare.
2. The only symptom that may occur in the early stage is intestinal hemorrhage.
3. The diagnosis is established only at operation or necropsy.
4. Roentgenographic examination for visualization of the tumor usually gives negative results.
5. The prognosis is reserved but good if the lesion is completely excised in an early stage.

ZUSAMMENFASSUNG

1. Das Leiomyosarkom des Jejunums ist eine sehr seltene Erkrankung.
2. Im Fruehstadium kann die Darmblutung das einzige Symptom bilden.
3. Die Diagnose wird nur bei der Operation oder bei der Obduktion gestellt.
4. Die Roentgenuntersuchung ergibt gewoehnlich negative Resultate.
5. Die Prognose muss mit Vorsicht gestellt werden, ist aber gut, wenn eine vollstaendige Resektion im fruehen Stadium erfolgt.

RÉSUMÉ

1. Le léiomyosarcome du jéjunum est très rare.
2. Le seul symptôme qui puisse être constaté au premier stade est l'hémorragie intestinale.
3. Le diagnostic n'est qu'à l'opé tion ou à l'autopsie.

4. L'examen radiologique de la tumeur est en général négatif.

5. Le pronostic est réservé, mais bon si la lésion est excisée à son state de début.

RESUMEN

1. El leiomiosarcoma del yeyuno es muy raro.

2. El único síntoma que puede ocurrir en estadio temprano es la hemorragia intestinal.

3. El diagnóstico se estable únicamente por operación o necropsia.

4. La visualización roentgenológica del tumor generalmente proporciona resultados negativos.

5. El pronóstico se reserva, si la lesión es extirpada completamente en estadio primario.

RIASSUNTO

1. Il leiomiosarcoma del digiuno è rarissimo.

2. L'emorragia intestinale può esserne l'unico segno, all'inizio.

3. La diagnosi è possibile solo operatoriamente o all'autopsia.

4. L'indagine radiologica di solito non è di aiuto.

5. La prognosi può essere buona se la lesione venga completamente asportata in una fase precoce.

SUMARIO

1. O leiomiosarcoma do jejuno é muito raro.

2. O único sintoma pue pode ocorrer na fase inicial é a hemorragia intestinal.

3. O diagnóstico é apenas estabelecido por ocasião da operação ou da necrópsia.

4. A visualização radiográfica do tumor dá em geral resultados negativos.

5. O prognóstico è reservado, mas bom, caso a lesão seja completamente extirpada na fase inicial.

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Treatment of Electric Burns

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CONTRIBUTIONS to this article by one of us (E. W. M.) are based on almost half a century of experience in the treatment of electric burns, as director of the Medical Staff of the Wisconsin Electric Power Company.

With the rapid development of various types of electric equipment and the use thereof industrially and in the home, the incidence of electric burns is an increasing hazard and a correspondingly serious problem to the physician.

In order to understand the treatment of electric burns, we consider it necessary to know and consider the various distribution systems of the human body. In the order of frequency encountered as burn sites they are as follows:

1. *The skin surface.* It has been proved beyond a doubt that in many contacts with high voltage the current is entirely dissipated over the skin surface of the body. This is true particularly during hot weather, when there is an abnormal amount of moisture on the skin.

2. *The venous circulation.* In this connection the venous circulation must be definitely differentiated from the arterial system. Venous circulation lies superficially; the arterial circulation lies much deeper.

In almost every case of contact with electricity, when there is destruction of tissue, complete thrombosis of the venous structure is observed not only in the burned area but extending in some cases as much as 6 inches (15 cm.) from the outer border of the burned area. This proves conclusively that the electrical discharge has traversed the venous structure and has produced thrombosis or clotting of the blood which in the past has presented serious complications. The fact that the venous system is being a conductor of electricity is practically always demonstrated when lightning strikes a person or an animal, and in every case there is extensive thrombosis of practically the entire venous circulation, in both the human and the animal system.

3. A combination of the skin and venous system as distributors. This undoubtedly is more frequently encountered than is distribution by the venous system alone.

4. Nerve distribution. This, which would logically appear to be frequent, is rarely encountered. The central and peripheral nervous systems seem to act as conductors only in those cases in which contact with the current is made around the occipital region of the scalp and the soles of the feet.

One of us (E. W. M.), in observing hundreds of persons who had come into contact with electrical energy, noted only 3 cases in which it could be proved that current had traveled through a part of the nervous system. In those cases he observed also that the spinal cord itself was not involved, but only the nerve roots that originate in the spinal cord and spread outward. Strangely also, in each of these 3 cases, the electri

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

selected the motor roots of the nerve trunk and left the sensory roots entirely untouched, giving rise to a peculiar type of spastic paralysis.

The point of entrance and exit of the current seems to determine the course of the current over the various distribution systems, singly or in combinations thereof. It is quite well established that only in rare cases does the current traverse a course through the deeper structures and that, in the majority of contacts with electrical equipment, the current passes over the surface of the body from the point of entrance to the point of exit and pursues a course immediately beneath the skin, following the superficial blood vessels.

At this point I should like to review the fundamental factors that make for serious electric burns. Naturally, the most severe burns of this type are encountered in connection with the construction and operation of high voltage equipment. Nevertheless, serious situations arise from contact with voltages as low as that employed in electric lights or household equipment circuits, namely, 110 volts, and in the past thirty years, to the personal knowledge of one of us (E. W. M.), there have been approximately 10 deaths in the state of Wisconsin from 110-volt circuits.

Let us consider for a moment the various elements involved: (1) direct current; (2) alternating current; (3) voltage as referred to direct or alternating current; (4) amperage; (5) ohms; (6) ground, and (7) duration of contact. It has been definitely established that direct current produces more severe burns than does alternating current. It is also a fact that voltage *per se* is not the greatest offender in the production of deep or extensive burns. Amperage is quite certainly the factor of greatest damage to tissue. Then, too, the resistance of the person concerned must enter into the picture, as well as the duration of contact, and the character of the ground. In some cases the contact is broken by the injured person's falling after becoming unconscious; in other cases he must be removed from the contact by force. Given these factors, namely, voltage, amperage, resistance and duration of contact and good ground in their proper relation, together with the points of entrance and exit of the current (since these points determine the course of the current over or through the body), one can quite accurately determine the degree of burn.

Prior to consideration of the burn itself it is frequently necessary to treat the intrinsic electric shock that accompanies the accident. In many cases, were it not for treatment of electric shock, treatment of the burns would not be required. Shock treatment consists primarily of resuscitation, and the most generally accepted method is the so-called Sylvester or prone method of resuscitation, in the administration of which every physician should become proficient in administering.

The most serious aspect of electric shock *per se* is its effect upon the respiratory center, producing respiratory failure and cardiac fibrillation which can be combatted successfully in most cases by early institution of resuscitation measures.

Many theories have been proposed as to what happens to the human brain when, under proper conditions, electricity in some manner travels over and through the body. It has been suggested that electricity may produce molecular degeneration of brain cells. This theory, to our knowledge, has not been proved, and the exact manner in which this serious effect of electric current on the respiratory center of the brain occurs, has not been determined. It is generally known, however, that cessation of respiration produces a condition in the brain known as anoxemia, and when the supply of oxygen to the brain is completely exhausted for fifteen or twenty minutes it is assumed that some degree of permanent damage is suffered by the cells of the brain tissue. This fact emphasizes the necessity for immediate resuscitation whenever possible and by whatever means are most applicable under the existing conditions.

In contradistinction to thermal burns, if the patient recovers from the effects of the electric shock, usually no complications are encountered other than the destruction of tissue as a result of the burn.

Patients with electric burns usually do not present loss of body fluids, electrolyte imbalance, lowering of the blood chemical values or renal failure.

Like thermal burns, electric burns are classified as first, second, and third degree.

First degree burns are those in which there is merely blanching of the superficial layers of the skin, with vessicle formation. Second and third degree burns are distinctive and can be recognized and diagnosed even in the absence of a history of contact with electric current. The center of such burns has a charred appearance. Immediately outside the charred area is a blanched areola with thrombosed veins, and surrounding this is an area of hyperemia. Second and third degree electric burns may be of any size, from punctate involvement to a vast destruction of tissue, either to a minimum depth or involving all the structures of the affected part.

Treatment, therefore, can be directed to the burn itself immediately after recovery from the electric shock, if shock has been present. First aid treatment should consist of free application of some protective covering with an oil base. On arrival of the patient at a physician's office or a hospital, immediate cleansing with tepid water and soap is effective for further sterilization. Any neutral soap has as much germicidal potentiality as any of the other disinfectants generally used, if not more, and is less inhibitive to tissue healing. It might be assumed that the heat associated with severe electric burns would render the surface sterile, but this is not necessarily correct.

After the initial cleansing the patient should be taken to an operating room. With general anesthetic and an aspetic technic, a radical excision of all necrotic or burned tissue should be done. With some degree of experience, complete removal can be accomplished in such a way that no healthy tissue is sacrificed. We wish to emphasize the importance of early débridement of electric burns. By "early" we mean within a few hours after the accident, for prompt action is the *sine qua non* of radical excision without the sacrifice of normal tissue.

In those cases in which only the skin and the subcutaneous tissues are involved, almost immediately after the burn there develops an edematous demarcation between the burned tissue and the normal tissue, which makes it easily possible to dissect away the burned tissue at once. In those cases in which the skin, subcutaneous tissue and muscle are burned, the involved muscle tissue presents a typical milk chocolate color that neither of us has observed in association with any other condition. This chocolate-colored tissue is bloodless and easily cut, and one should have no difficulty in determining the outer margin of the burned area that must be excised. Waiting longer than twelve hours makes the surgical débridement considerably more difficult, as the lines of demarcation between devitalized and healthy tissue are beginning to be lost; consequently, either the débridement is inadequate or the excision becomes too radical, with unnecessary loss of normal tissue.

In connection with débridement, we

have learned that it is necessary, in order to remove all of the necrotic tissue, to extend the dissection beyond the red areola and excise all thrombosed veins. Electric burns do not disturb the arterial system beyond the margin of the necrotic areas, but the veins, almost without exception, are completely occluded or thrombosed for some distance beyond this margin. It is occasionally necessary to dissect these thrombosed veins for a distance of 2, 3 or even 4 inches (5, 7.5 or 10 cm.) from the margin of the burned areas.

After completion of the débridement, immediate closure of the wound can be done, either primarily or with a split skin graft or a reconstructive procedure. By this method we have been able not only to shorten the patient's period of disability but, in patients whose burns require reconstruction of the burned areas, to obtain better functional and cosmetic results with a minimum of operations.

Electric burns involving bone cannot be treated by immediate radical removal. The line of demarcation in bone presents itself much more slowly, and if the bone is permitted to remain intact for four to six weeks, the appearance of a darkened bone will invariably outline the destroyed area. Granulations are more readily acquired under the protection of necrosing bone, and on ultimate removal of the granulating sequestrum the surface is immediately available for grafting or other reconstructive measures. Roentgen examination of the bone structures that were obviously in the path of the electric current shows no pathologic changes immediately following the contact.

A most interesting phenomenon is the destruction of cartilage, which occurs not infrequently where complete destruction of the soft tissue was not demonstrable. With removal of the burned areas, both the bony structures and the cartilaginous structures appeared normal within about three weeks; contractures of all the joints of the fingers took place; roentgen examination revealed the fact that the cartilage of the joints had been destroyed, resulting in ankylosis of all the joints. This results in a "claw" hand or hands, as the case may be, and the ultimate result is a permanent disability, with a high incidence of loss of the hand at the wrist.

Tendon and nerve destruction present another serious problem, since frequently a considerable portion of either or both may be destroyed. As with thermal burns, the final treatment of nerves and tendons involved in an electric burn must be delayed for a considerable time. As an adjunct to the surgical treatment we employ, of course, the various antibiotics, supportive measures and, in cases of infection, a 2 per cent thiosinamine ointment. Thiosinamine has been used for many years as an agent to absorb cicatricial tissue. On that basis one of us (E. W. M.) reasoned that if this medicine could absorb scar tissue it might also be used to prevent the formation of scar tissue, a theory that was borne out in many of his cases. A word of caution, however, as to 2 per cent thiosinamine ointment. One often encounters patients who are allergic to it.

We shall not discuss here the complications resulting from electrical burns, but we do wish to call attention to a most serious complication resulting from contact with high voltage electrical energy, i. e., the development of cataract in one or both eyes, and a most startling complication noted by one of us (E. W. M.), namely, a fracture of one of the lumbar vertebra without any fall, brought about by muscular contraction that produced "jack-knifing" of the spine.

CONCLUSION

Electric shock *per se* is not serious if proper methods of resuscitation are immediately instituted. The passage of electrical current over or through the body leaves no ill effect other than the destruction of tissue, manifested as electric burns.

The treatment of all second and third degree electric burns is wholly surgical.

The débridement of second and third degree electric burns should be done within twelve hours, and primary closure of the wound or covering of the wound with a split skin graft in conjunction with reconstruction of the involved area should be done immediately after completion of the débridement.

This plan of treatment of electric burns shortens the period of disability, lessens the degree of suffering and offers the patient a much better functional and cosmetic result with a minimum of reconstructive procedures.

RÉSUMÉ

Le choc électrique n'est pas dangereux en lui-même si l'on institue immédiatement les méthodes de ressuscitation. Le passage du courant électrique sur ou à travers le corps ne laisse pas d'autre trace que celle de la destruction des tissus par brûlure électrique.

Le traitement de toute brûlure électrique du 2e ou 3e degré est purement chirurgical.

Le débridement de ces brûlures devrait être pratiqué durant les douze premières heures, et la suture primaire ou le recouvrement de la plaie au moyen d'une greffe devrait suivre immédiatement le débridement.

Ce plan de traitement des brûlures èlectriques raccourcit la durée de l'incapacité, diminue les souffrances et donne un résultat esthétique et fonctionnel bien meilleur avec un minimum de temps opératoires.

RESUMEN

El electrochoque no es grave si se instituyen los métodos adecuados de resucitación. El paso de una corriente eléctrica sobre el cuerpo no deja otros efectos perjudiciales que los de destrucción tisular manifestada como quemaduras eléctricas.

El tratamiento de todas las quemaduras eléctricas de segundo y tercer grado es totalmente quirúrgico. Dichas quemaduras deben de obligarse durante las primeras doce horas, haciendose un injerto de piel en unión con reconstrucción del área afectada, o cierre primario de la herida.

Este plan de tratamiento acorta el período de capacidad, disminuye el sufrimiento y ofrece al paciente un mejor resultado functional y cosmético con un mínimo de procedimientos reconstructivos.

RIASSUNTO

Lo shock elettrico di per se stesso non è grave se si abbiano a disposizione gli adatti metodi di resuscitazione. Il passaggio di corrente attraverso il corpo non determina altri effetti oltre alla distruzione dei tessuti che caratterizza l'ustione elettrica. La cura delle ustioni di 2° e 3° grado è senz altro chirurgica. Lo sbrigliamento deve essere fatto entro le 12 ore, e seguito immediatamente dalla sutura primaria della ferita oppure dalla copertura con trapianti di cute. Questo metodo abbrevia il pericolo di malattia, riduce le sofferenze e porta arisultati migliori dal punto di vista estetico e funzionale.

ZUSAMMENFASSUNG

Der elektrische Schlag ist an sich nicht gefaehrlich, wenn geeignete Wiederbelebungs methoden sofort zur Anwendung gelangen. Die Passage des elektrischen Stromes ueber oder durch den Koerper hinterlaesst ausser der Gewebszerstoerung, die sich als elektrische Verbrennung darstellt, keine schaedlichen Folgen.

Die Behandlung aller elektrischer Verbrennungen zweiten [illegible] ist eine rein chi[illegible]

Die Wundtoilette elektrischer Verbrennungen zweiten und dritten Grades sollte innerhalb von zwoelf Stunden erfolgen, und unmittelbar nach ihrer Durchfuehrung sollte ein primaerer Wundverschluss oder eine Deckung der Wunde mit einem gespaltenen Hautlappen in Verbindung mit Wiederherstellung des befallenen Gebietes ausgefuehrt werden.

Die Durchfuehrung dieses Behandlungsplanes elektrischer Brandwunden verkuerzt die Zeit der Arbeitsunfaehigkeit, mindert den Grad des Leidens und gibt dem Kranken Aussicht auf erheblich bessere funktionelle und kosmetische Endergebnisse mit einem Minimum rekonstruktiver Massnahmen.

SUMARIO

O choque elétrico em si não é grave, desde que sejam instituidos imediatamente os métodos de ressuscitação. A passagem da corrente elétrica sôbre um ponto ou através do mesmo hão deixa outro efeito que não seja a destruição de tecido, manifestada como queimaduras por eletricidade.

O tratamento de todas as queimaduras elétricas de primeiro e segundo graus é inteiramente cirúrgico.

O debridamento de queimaduras elétricas de segundo e terceiro graus deve ser feito dentro de 12 horas e o fechamento primário da ferida ou seu revestimento por enxerto, juntamente com a reconstrução da área comprometida devem ser feitos imediatamente após o debridamento.

Este plano de tratamento das queimaduras elétricas diminui o perigo de incapacidade, diminui o grau de sofrimento e oferece ao paciente um resultado funcional e cosmético muito melhor, com o mínimo de intervenções reconstrutivas.

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It is not a question how much a man knows, but what use he makes of what he knows; not a question of what he has acquired, and how he has been trained, but of what he is, and what he can do.

—*Holland*

If we think of life as a journey and consider it to be the opportunity for getting from where we are to where we want to be, we will have a working rule that provides us with both a purpose and expanding possibilities for our lives.

—*Corson*

Each of us is an impregnable fortress that can be laid waste only from within.

—*Flynn*

Squamous Cell Carcinoma of Bartholin's Gland

Report of a Case

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CHICAGO, ILLINOIS

PRIMARY carcinoma of Bartholin's gland is apparently quite rare; 111 cases had been reported up to January 1954. The percentage of squamous cell tumors has been given as 35.4, while adenocarcinoma has been present in 47.3 per cent; the remaining 17.3 per cent included 4 sarcomas and 15 other tumors difficult to classify.[1] The reader is referred to the bibliography for a comprehensive consideration of the subject. A case is briefly reported here.

REPORT OF CASE

Mrs. E. A., an almost white Negress 66 years old, entered Wesley Memorial Hospital on Jan. 20, 1952, complaining of a painful "lump" of two years' duration in the lower left portion of the vulva; a blood-tinged discharge at intervals from this region; dyspareunia; stress incontinence, and pruritus vulvae.

The patient had undergone hysterectomy for fibroids in 1927. She was treated in 1930 for syphilis and was cured. A rectal fistulectomy was performed in 1943.

With regard to the present illness, a small lump in the left labium was first noticed in 1947 (five years earlier). It began to bother the patient after she married for the third time in 1952. Bloody and yellowish discharge from the labial mass occurred occasionally.

Physical examination showed the patient to be well nourished and apparently in good health. There were no significant abnormalities except in the genitals. Bartholin's gland on the left was moderately enlarged, soft, and fluctuant near the surface. A hard nodule the size of a filbert was palpable in the lower posterior portion. The entire area was hyperemic. There was no leukoplakic vulvitis. Nothing remarkable was observed in the vagina or in the rectum. There were no palpably enlarged glands in the inguinal or femoral regions. Slight cystocele and urethrocele were present.

A Kahn test gave negative results. The urine was normal. There was slight anemia.

A diagnosis of infected cyst of Bartholin's gland was made. In view of the rarity of primary carcinoma in this gland, it was considered most likely that the hard mass the size of a filbert was due to inflammatory induration.

Operation was performed on Jan. 21, 1952. The cyst had ruptured, probably owing to the preoperative preparation. With the patient under pentothal and nitrous oxide anesthesia, the gland and the filbert-sized nodule were removed by blunt and sharp dissection. The hard nodule was then first recognized as a neoplasm. The wound was closed and further surgical treatment postponed to await the pathologic diagnosis which described the specimen as showing poorly differentiated squamous cell carcinoma in fibrous connective tissue.

Reoperation was performed on January 30: vulvectomy, followed by dissection *en bloc* of the inguinal and femoral gland regions on the left side. The entire vulva was removed by two circular incisions. The inner incision was made along the border of the caruncula myrtiformes. The outer one included the clitoris. In the region of the removed Bartholin's gland and tumor the tissue was thickened, indurated and grayish tan. This tissue was removed and the vulvectomy wound closed. Temporary dressings were applied, and the patient was prepared for dissection of the glands. A Foley catheter was placed in the bladder.

The incision for the *en bloc* dissection was made diagonally across the [illegible] as

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From the Department of Surgery, Wesley Memorial Hospital, Chicago, Illinois.

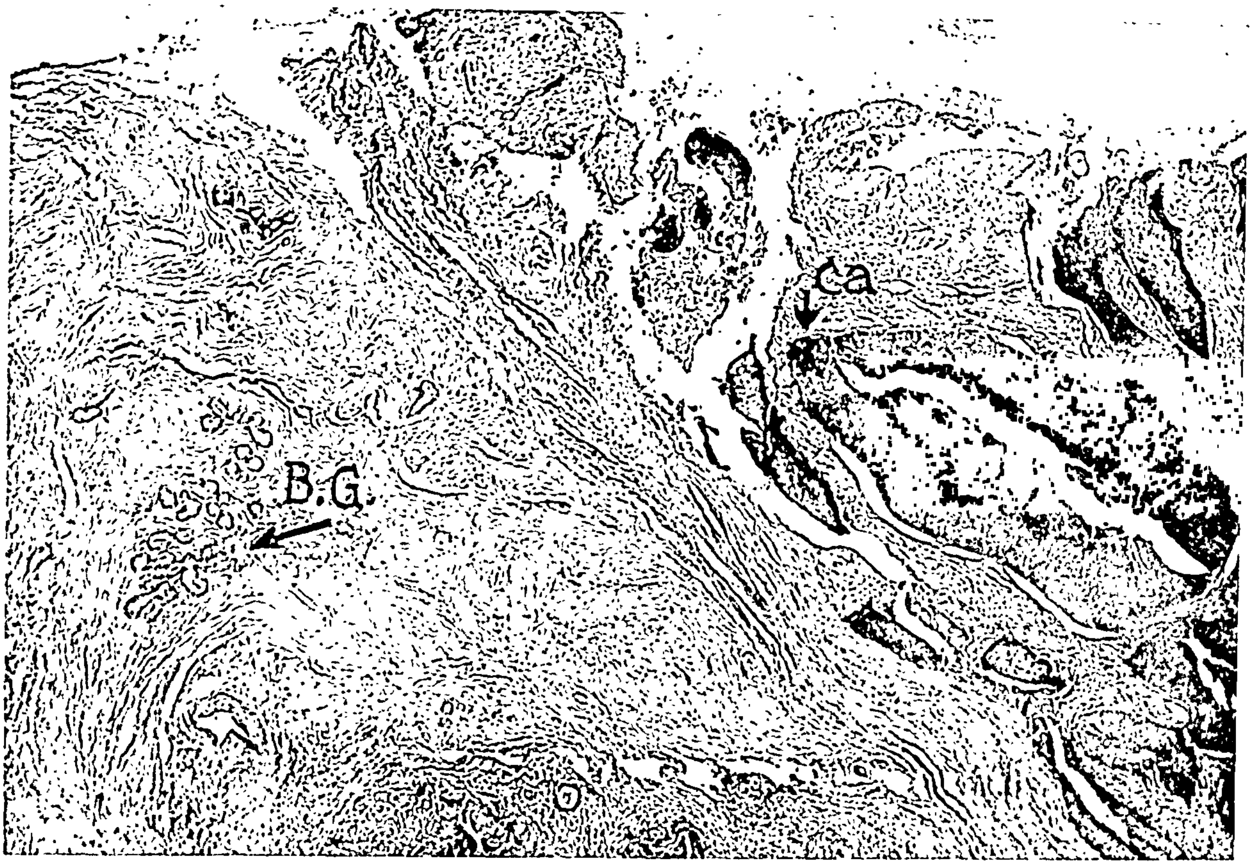

Fig. 1.—Photomicrograph showing typical Batholin's glands at *BG* and squamous cell carcinoma at *Ca*.

in hernia repair, and extended down to the apex of the femoral triangle. The skin and subcutaneous fascia were undermined and retracted. A wide dissection was performed at the proximal end. All tissue down to the external oblique aponeurosis, the pectineus fascia, and the fascia lata was removed. The saphenous vein was doubly ligated and severed about 2 inches (5 cm.) distal to the saphenofemoral juncture. Two of its tributaries were similarly treated. The innermost compartment of the femoral sheath was opened. Cloquet's gland was not observed, but two lymph vessels and a small amount of fat were removed.

The external aponeurosis was not opened for dissection and removal of glands in the obturator and external iliac regions. The patient's condition required another unit of blood (the third), and further surgical maneuvers seemed inadvisable. The wound was closed and pressure dressings applied, and a Rugby supporter was placed over all. The patient's condition at the conclusion was satisfactory. The operating time was three and one-half hours.

The pathologic diagnosis (Fig. 1) was as follows:

"1. Moderately well differentiated squamous cell carcinoma in Bartholin's gland and fibrous connective tissue. Fibroadipose tissue the seat of acute and chronic inflammation.

"2. Acute and chronic inflammation of subcutaneous fibroadipose tissue of vulva. Clitoris: no pathologic diagnosis.

"3. Lymph nodes (5 of 5 sections): no pathologic diagnosis."

The vulvectomy wound healed by primary intention. There was partial necrosis with disruption in the inguinal wound. Secondary closure in the patient's bed was not successful, and healing by granulation required about three weeks. The Foley catheter was removed on the fifth day. The patient was out of bed on the third postoperative day and was discharged from the hospital on February 29, with the inguinal wound almost healed. She requested an exact diagnosis, and the depression that followed was alleviated by Dexamyl.

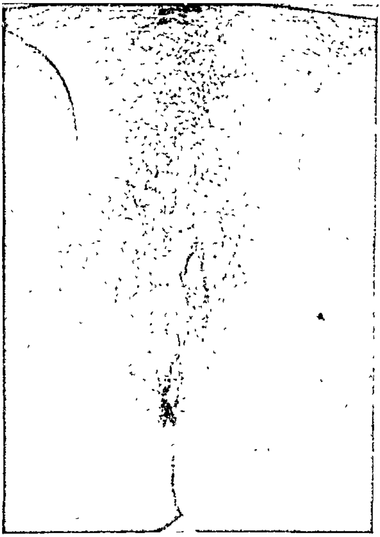

Fig. 2.—Completed operation.

The stress incontinence was relieved by Probanthine.

After the inguinal wound was healed, 24 roentgen treatments were given, as follows: Daily dose of 250 r on the skin through 2 anterior 10 by 15 cm. portals and 2 posterior portals, the anterior and posterior portals being alternated. The total dose was 3,000 r on the skin to each portal. The factors used were: 400 kilovolts, 5 milliamperes, a modified Thoraeus filter, HVL 4.25 mm. of copper, and 13.5 r roentgens in air per minute.

The patient has been examined every six months in a little over three years since the operations. There is no evidence of regional recurrence, spread or metastasis. She offers no complaints and is apparently enjoying a normal life. There is no dyspareunia. A current photograph is presented.

SUMMARY

A case of squamous cell carcinoma of Bartholin's gland in a 66-year-old Negress is reported. Vulvectomy and dissection *en bloc* of the left inguinal and femoral gland regions were performed. Three years later the patient was living normally, with no complaints.

ZUSAMMENFASSUNG

Es wird über einen Fall von Schuppenzellkarzinom einer Bartholinschen Drüse bei einer 66 jährigen Negerin berichtet. Es erfolgte eine Vulvektomie und eine Blockresektion der Lymphknoten der linken Leistenund Oberschenkelgegend. Zweieinhalb Jahre nach der Operation war die Patientin am Leben und beschwerdefrei.

RESUMEN

Se comunica un caso de carcinoma espinocelular de la glándula de Bartholin en una mujer negra de 66 años de edad. Se realizó una vulvectomía con disección en bloque de los ganglios de las regiones inguinal y femoral izquierdos. Dos años y medio después la paciente se encontraba viviendo normalmente y sin molestias.

RÉSUMÉ

Rapport d'un cas de carcinome de la glande de Bartholin chez une femme noire de 66 ans. Vulvectomie et dissection en bloc des régions glandulaires inguinales et fémorales. Deux ans et demi après, la guérison se maintenait.

RIASSUNTO

Viene descritto un caso di carcinoma a cellule squamose della ghiandola di Bartolino, osservato in una vecchia negra di 66 anni. Fu eseguita una vulvectomia seguita dall'asportazione in blocco delle linfoghiandole inguino-crurali di sinistra. Rivista dopo due anni e mezzo, la paziente conduceva vita normale e non aveva disturbi.

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Politics is largely governed by sententious platitudes which are devoid of truth.

One of the most widespread popular maxims is, "Human nature cannot be changed." No one can say whether this is true or not without first defining "human nature." But as used it is certainly false. When Mr. A utters the maxim, with an air of portentous and conclusive wisdom, what he means is that all men everywhere will always continue to behave as they do in his own home town. A little anthropology will dispel this belief . . . There is one peculiarly pernicious application of the doctrine that human nature cannot be changed. This is the dogmatic assertion that there will always be wars, because we are so constituted that we feel a need of them. What is true is that a man who has had the kind of diet and education that most men have will wish to fight when provoked. But he will not actually fight unless he has a chance of victory. It is very annoying to be stopped by a policeman, but we do not fight him because we know that he has the overwhelming forces of the state at his back. People who have no occasion for war do not make any impression of being psychologically thwarted. Sweden has had no war since 1814, but the Swedes are one of the happiest and most contented nations in the world. The only cloud upon their national happiness is fear of being involved in the next war. If political organization were such as to make war obviously unprofitable, there is nothing in human nature that would compel its occurrence, or make average people unhappy because of its not occurring. Exactly the same arguments that are now used about the impossibility of preventing war were formerly used in defense of dueling, yet few of us feel thwarted because we are not allowed to fight duels.

—*Russell*

Surgical Treatment of Naevus Flammeus

Evaluation of Procedures

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NAEVUS flammeus or nidosus, often referred to as capillary hemangioma and popularly known as a port wine stain, is characterized by proliferation of the superficial vascular plexus within the dermis. Clinically it is a flat, smooth area of skin with discoloration varying from pale brown to purple red. All variations in intensity may be present, depending on the number and the degree of dilatation of the capillaries and their location in relation to the surface (Fig. 1). The capillaries are of the mature adult type and do not differ morphologically from the blood vessels of similar caliber in unaffected parts.

The port wine mark is much less common than are other forms of hemangioma. It affects the female about twice as frequently as the male. It has a definite predilection for the face, though large areas of the extremities and trunk may be involved. On the face it usually involves one side and may vary in size from a small patch to the entire half of the face and neck. The oral mucosa and conjunctiva are often affected.

The lesion appears at birth, but during the first year of life its intensity may change. It rarely fades; more often it gains in intensity. An exception is the telangiectasia nuchae, a red spot over the nape of the neck frequently observed in infants, which usually disappears within the first few years.

The naevus flammeus does not show any tendency to spread, except to keep pace with the growth of the patient. It does not ulcerate, and the danger of malignant degeneration may be discounted. In later life the involved skin sometimes thickens, becomes coarse and gives rise to multiple small hemangiomatous nodules. The capillary hemangioma is occasionally accompanied by other vascular anomalies like diffuse hemangiomatous hypertrophy of the lip. Its association with hemangioma of the brain (encephalofacial angiomatosis; Sturge Webber's disease) and with other neuropathic manifestations have been reported.

It is true that the naevus flammeus presents a purely cosmetic disability, but this does not lessen its importance. On the face, if it involves a large area and its color is intense, it may be classified among the most severe disfigurations. It attracts morbid attention and from early childhood creates a repulsive impression. In modern civilization its social and economic implications are severe. The psychologic effect upon the patient is particularly serious. It is primarily the patient with a naevus flammeus of the face who seeks medical assistance, and it is such patients with whom this article is concerned.

Nonsurgical Treatment.—Methods have been suggested from time to time for the treatment of capillary hemangioma. It is now universally recognized, however, that any procedure based upon the assumption that the naevus flammeus can be eliminated or attenuated by removal or destruction of superficial layers of skin is doomed

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Presented at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

to failure. If sufficient dermal elements are left behind to permit spontaneous regeneration, the regenerated skin will exhibit the same characteristics as the original one. Thus superficial desiccation, blistering with carbon dioxide snow, abrasions, etc., have no practical value. A few radiologists claim that contact roentgen rays or Grenz rays reduce the deep color in some capillary hemangiomas.[1] It is almost generally accepted, however, that irradiation in safe doses has little to offer. In fact, the majority of port wine nevi hemangioma coming to operation exhibit a radiodermatitis of varying degrees superimposed upon the nevus. In these cases it is the radiodermatitis—with its sequelae, scarring, ulceration and the possibility of malignant degeneration—that furnishes the primary indication for surgical intervention; such conditions, therefore, are beyond the scope of this paper.

In recent years the use of THORIUM X has been recommended as a successful adjunct in the treatment of these lesions.[2] This agent is considered inoccuous. Its active element is the alpha particle, whose penetration is limited to the thickness of a sheet of paper. It is applied in varnish or alcohol and is painted over the lesion. The usual course consists of sixteen treatments six weeks apart. Lacking personal experience with this substance, I can only quote from H. G. Wallace: "While it does not eliminate the staining, in two-thirds of the cases treated (about 70) the intensity of the discoloration was reduced. The response was far from uniform and predictable." The experience of other dermatologists has been less encouraging, and many of them have abandoned this form of treatment.

Another method that has strong advocates is camouflage by tattooing with insoluble inorganic pigments.[3] Obviously, the darker or more deeply purple the lesion, the more difficult it is to neutralize it with pigment. The tattooed area does not blend with the normal skin; it does not match it in texture and color; it has a granular and uneven appearance resembling the effect of an ineptly applied cosmetic.[4, 5] Its value may be that it softens red lesions and facilitates the application of cosmetics, but it fails when assistance is most needed, namely, when the discoloration is particularly intense.

At present, camouflage by cosmetics is the most widely used method of concealing port wine stains. Several creams, as well as a variety of pancake makeups and "cover marks," are available for this purpose. Again, the darker the lesion the thicker the layer of makeup required to conceal it. Local application alone is unsatisfactory, since the area stands out in contrast to the surrounding skin. The only satisfactory way to apply the makeup is to cover the entire face with a uniform layer. Many women object to such heavy artificial makeup, and it is particularly objectionable to men.

The current attitude of the dermatologist on the treatment of port wine marks has been summed up in a recent textbook,[5] which states that the hazards of any effective treatment are so great that it is best not to treat naevus flammeus at all.

Surgical Treatment.—This consists of excision of the involved skin and appropriate replacement. It is not the intention of this paper to suggest that every port wine mark should be so treated. In view of the ineffectiveness of the nonsurgical treatment, however, it is pertinent to determine what surgical measures can offer. The limitation of surgical treatment is that most resurfacing procedures, e. g., flaps and grafts, are functionally adequate but cosmetically not equally satisfactory. They do not always match the normal skin in texture and color. This discrepancy in coloring, however, will never be so pronounced as in the case of a severe naevus

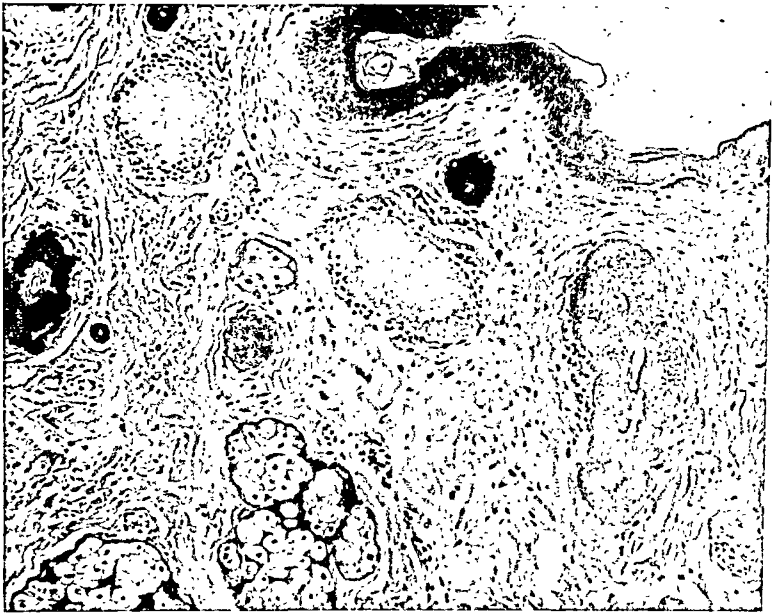

Fig. 1.—Naevus flammeus (specimen in Case 1). Note increased number and caliber of capillaries in the subepithelial layer. Similar observations were made within the cutis. The subepithelial site of the vessels was most frequently seen in the specimens examined, though it is not necessarily typical of all kinds of capillary hemangioma.

flammeus, and often the substitute skin can be made quite acceptable by a judicious selection of grafts and flaps. In this respect, surgical treatment of port wine stains is more promising than any other modality. Any operation, of course, involves formation of scars and carries the possibility of certain complications that are the sequelae of a normal healing process—shrinkage of grafts and contracture of scars, which in turn may lead to formation of cicatricial bands, distortion of the facial structures and obliteration of the facial features. Such an effect can easily nullify the color improvement and replace a congenital deformity with a surgical one. The injudicious use of the available surgical technics, such as simple application of one extensive split skin graft, no matter what the size and location of the lesion, is responsible for the prevailing opinion that the surgeon has nothing to offer in the treatment of naevus flammeus. Surgical planning must therefore be directed toward keeping the scarring to a minimum and avoiding cicatricial deformities. Such a surgical plan, predicated on the maximum cosmetic improvement, may require several operative stages. Although these procedures are not life-endangering (they require a minimum of hospitalization and involve an average convalescence of two weeks), the whole treatment may require a great deal of economic and emotional effort, of which every patient is not capable. The severity of disfigurement and the patient's personality must be equated with the anticipated result and the extent of the surgical effort. Frank discussion with the patient will eliminate several candidates unsuited for operation and will realistically prepare the few who go through with the treatment.

What surgical intervention can accomplish can best be illustrated by presentation of a few cases. These cases were selected not only with a view to demonstrating the end result but because the problems and complications encountered are of interest. Although the surgical plan depended on the location and extent of the lesion, it always evolved from the following considerations:

The best cosmetic result could be obtained by utilizing the adjacent facial and cervical skin. Resurfacing with contiguous skin offered the best match in texture and color. Amazingly large areas on the face could be replaced by repeated excisions and advancement or rotation of adjacent flaps.[6] This was always the first choice for resurfacing the kinetic part of the face, the cheeks and lips. On a man's face the normal outline of hair distribution limited the extent of this procedure. On a woman's face the cheek skin could be moved advantageously into the infraorbital and temporal regions.

In moving skin flaps across the cheek and into adjacent areas, any tension in the vicinity of the facial cavities was avoided, lest distortion of the features (lips, nostrils and lids) follow. An attempt was always made to place scars within the facial lines and folds, thus concealing the scar. Traversing them at right angles tends to obliterate the facial expression.

Obviously such a plan is feasible only if there is some uninvolved skin on the cheek. If the lesion extends over the entire face and includes the neck, little can be accomplished by this method. In such cases the only alternative was a large, thick split thickness graft covering the entire cheek and parts of the neck. This simplified the treatment and reduced the number of operative stages. The cosmetic end result, however, was less assured.

Skin flaps other than those taken from adjacent skin were scrupulously avoided when possible, but they had to be used occasionally. Not only did their transfer involve multiple stages, but they were too bulky, differing in color and texture from the surrounding skin. Massive skin flaps on the kinetic parts of the face conceal facial expression, giving the patient a mask-like appearance—a deformity more startling than any pathologic discoloration.

The para-orbital region (eyelids, both canthi), has its own tegumental characteristics—thin skin with little subcutaneous tissue. Adjacent skin cannot be moved into it from either the forehead or the cheek. This area was the exclusive site for the free skin graft. Selective full thickness grafts from behind the ear and above the clavicle "took" well in this location, had a minimal contractural tendency and matched the normal color of the region fairly well. The postauricular skin was particularly desirable for this purpose. On occasion I used all of this skin as a graft, substituting for it a split skin graft, which was perfectly adequate in this concealed location. The postauricular skin could be cut thin enough to resurface the upper lid and maintain its suppleness and the normal skin folds. On the lower lid and around the canthi the supraclavicular skin was used to equal advantage. Along the margin of the lower lids, large skin grafts were not considered desirable, since even slight contracture, though it did not produce outright ectropion, resulted in widening of the eye fissure. In some cases the infraorbital region was resurfaced first and another similar graft used along the margin of the eyelid at a later stage. The eyebrows were not disturbed. Their replacement by a free graft or flap is inadequate and too involved. The underlying hemangioma was concealed in varying degrees by the hair of the eyebrows. In women, the eyebrow pencil afforded an additional camouflage.

Selected free skin grafts were also preferred for resurfacing of the nose. In placing the skin grafts over the irregular surfaces around the eye and nose, the direction of the scars is of paramount im-

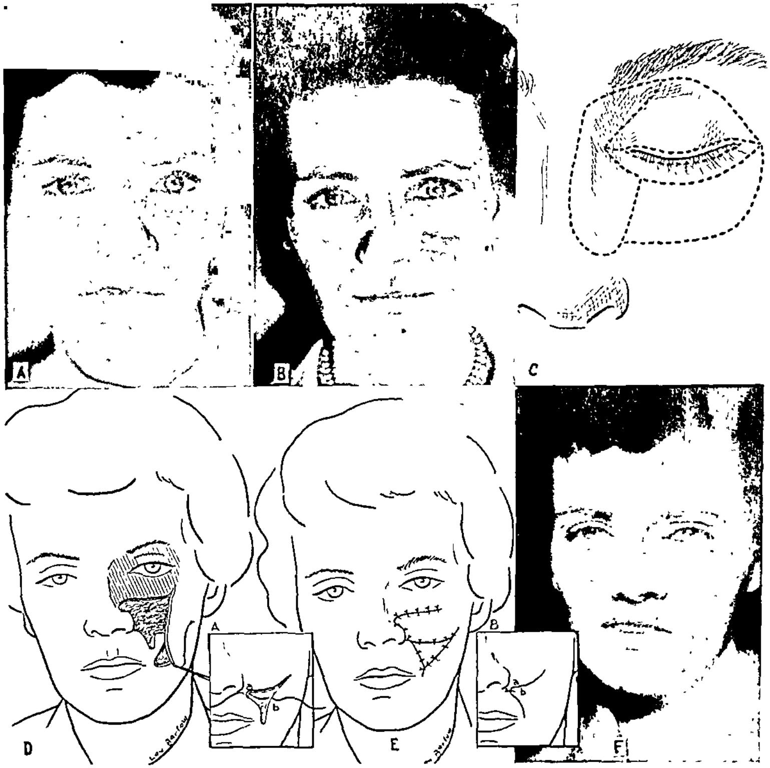

Fig. 2 (Case 1; see text).—*A*, original condition (lesion was bright red). *B*, appearance after the first operation. *C*, diagrammatic arrangements of skin grafts around the orbit. *D* and *E*, diagrams of rotation flap from the cheek (second operation; inset indicates the subsequent [illegible] scars) [illegible] final result.

portance. Particularly in the inner canthus, any straight scar contracts and forms bands which are very noticeable.

On the forehead, full thickness skin grafts from the inner surface of the upper arm or the proximal and medial surfaces of the thigh were sometimes employed. The thin skin of these regions offers excellent grafting material. When large defects of the forehead and cheeks had to be grafted, however, a thick split skin graft was preferred. Large grafts, 4 by 6 inches (10 by 15 cm.), could be obtained with ease. Their "take" was reasonably assured, and their appearance was not much different from that of the full thickness graft.

All free grafts were overcorrected and cut considerably larger than the defect. The coloration of the free graft was somewhat unpredictable. In some cases, after a considerable time, the graft blended beautifully with the surrounding skin. In a dark-skinned person, it was likely to acquire a brownish tint. In fair-skinned persons it sometimes remained too white. In a man its hairlessness was an additional undesirable factor. This disadvantage could be minimized by tattooing fine black dots that gave the appearance of hair follicles.

When the resurfacing was completed, individual scars were revised if it appeared that they could be improved. Hypertrophic scarring was not encountered, but the

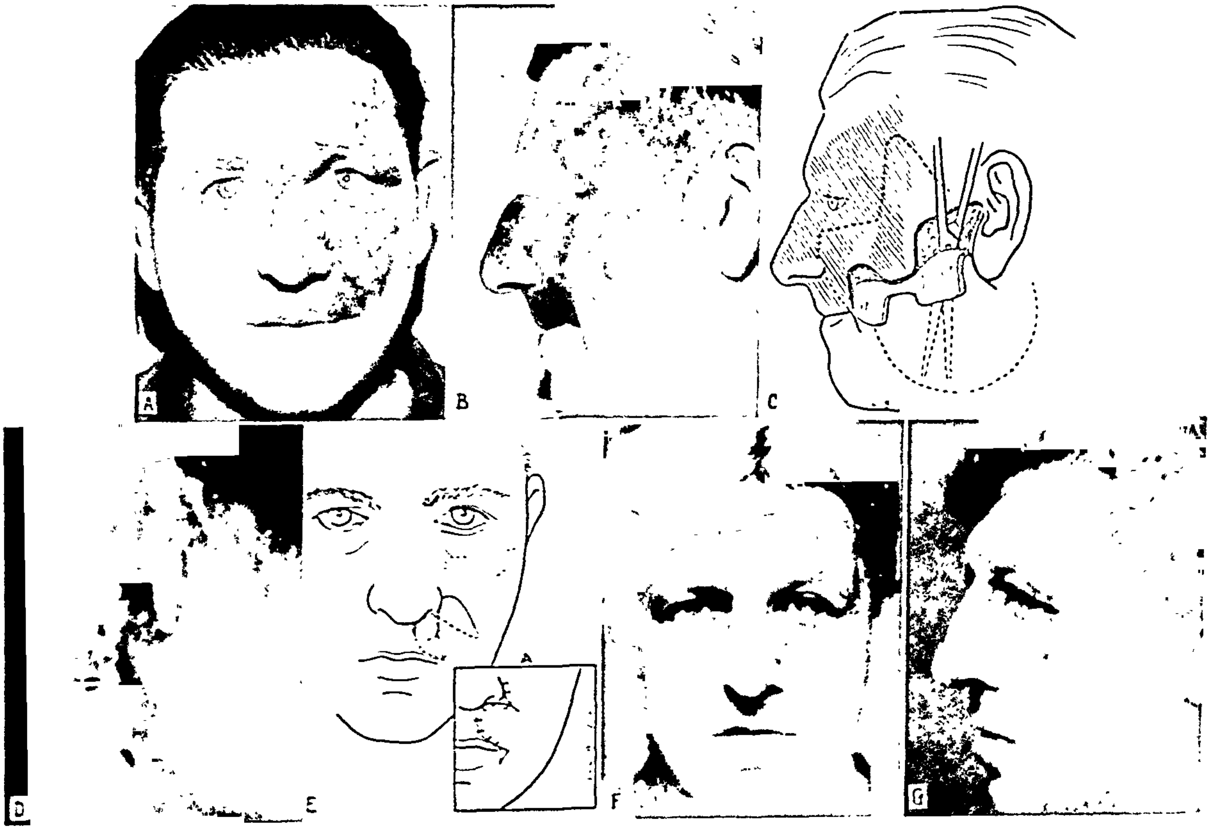

Fig. 3 (Case 2; see text).—*A* and *B*, preoperative condition. Lesion was dark purple. *C*, diagrammatic presentation of rotation and advancement of the cheek flap. Interrupted line indicates final position of flap after two operations and corresponds to the condition in *C*. *C*, diagram of a rotation flap from cheek to upper lip. *D*, intermediate condition after rotation of the cheek and paraorbital resurfacing with free grafts. Note scarring of graft on nose. *F*, tubed neck flap to nose. *G* and *H*, final result.

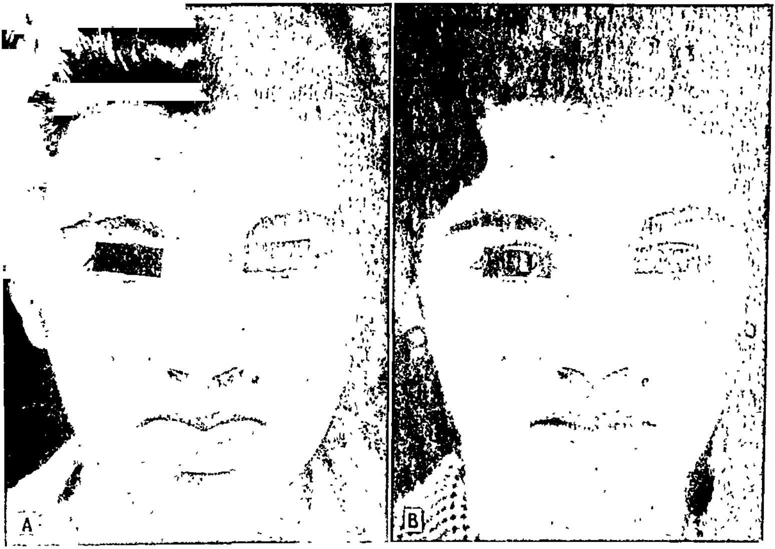

Fig. 4.—*A*, diffuse capillary hemangioma of lower lip and left cheek. Discoloration varied from light red on lower lip to spotty blue on cheek, with maximum intensity on lower lip. Note hypertrophy of lower lip. *B*, appearance after correction of hypertrophy of lower lip and application of cosmetics.

quality of the scars was not uniform. In a majority of cases they were not conspicuous and did not detract from the final result. In persons with thick, coarse skin the scars had a tendency to spread and were more noticeable.

Occasionally, in large grafts, spotty necrosis occurred owing to hematomas and the small scars marred the smooth appearance of the graft. Tiny hemangiomatous spots were noted in a few instances along the scars, but they did not enlarge. Possibly minute strips of the lesion were left behind during the dissection.

REPORT OF CASES

CASE 1.—A young nurse had a capillary hemangioma on the left side of the face (Fig. 2*A*). The lesion originally had been smooth, but in recent years hemangiomatous nodules had appeared on its surface. The patient had been discouraged ten years earlier from doing anything about her deformity. At the age of 30 she decided to seek help again.

At the first operation (Fig. 2*B*) a supraclavicular graft was divided into two fragments and used to resurface the side of the nose and the immediate infraorbital region. A flap from the cheek replaced the hemangioma below the skin graft (Fig. 2, *C* and *D*). This constituted the second operation. In a third operation a postauricular graft was used along the margin of the lower lid and at the inner canthus. Another graft was placed on the upper lid, and the scars on the cheek were revised. A lesion on the lip was excised. Each operation required about two weeks' convalescence. The operations were spaced throughout a year.

The result was very gratifying (Fig. 2*F*). The scars were negligible. The free graft blended well on the cheek but contrasted slightly with the skin of the nose. This could easily be concealed with ordinary makeup. The patient was well satisfied.

CASE 2.—A patient had a vivid purple naevus flammeus occupying the major portion of the left side of the face (Fig. 3, *A* and *B*). In recent years noticeable thickening and nodule formation had taken place within the lesion.

The normal skin from the lower and lateral part of the face was advanced to cover the entire cheek and was moved into the temporal region (Fig. 3, *C* and *D*). Later (Fig. 3*E*) a flap from the cheek was rotated into the upper lip. The forehead was covered with a thick split graft. In this swarthy patient the graft became pigmented. The paraorbital region was resurfaced with postauricular grafts. The involved temporal half of the eye-brow was narrowed when the adjacent tissues were excised and was tattooed to improve its coloring. The nose was covered with a supraclavicular graft. Subsequently cysts and abscesses kept developing in the graft on the nose, ruining its appearance. The original hemangiomatous lesion on the nose involved thick skin, with hypertrophy of sebaceous glands. In order to avoid exposure of nasal cartilages and fat the dissection was kept on a superficial plane, and evidently sebaceous elements were left behind. Eventually the skin graft was sacrificed and the nose resurfaced with a low cervical tubed flap, but the result was far from satisfactory (Fig. 3*F*). The flap likewise became hyperpigmented, and its smooth and bulky appearance looked unnatural on the face.

The flap on the nose, the pigmentation on the forehead, the noticeable scars and the contrast between the thick bearded skin on the cheek and the paraorbital grafts (Fig. 3, *G* and *H*) detracted from the final result. Nevertheless there was unquestionably a marked improvement over the original condition.

CASE 3.—The patient was a young girl with hypertrophy of the lower lip and hemangioma of the lower lip and left cheek (Fig. 4*A*). Parts of the lesions were uniformly soft red; other parts showed mottled blue discoloration of varied intensity.

The lip was reduced, but resurfacing of the hemangioma of the cheeks was not considered, as the discoloration was subdued and could easily be covered with cosmetics. The more intense area on the lower lip was tattooed (Fig. 4*B*).

SUMMARY

The naevus flammeus is a severe disfigurement for which patients invariably seek help. Since nonsurgical treatment has proved unsatisfactory, the surgical possibilities need to be explored.

Reviewing his own experience in these cases, the author has concluded that excision and surgical resurfacing, despite obvious limitations, may offer a degree of improvement that cannot be matched by other forms of treatment.

It cannot be denied that surgical treatment is more complex and hazardous, demanding more effort and sacrifice from the patient, but it remains the preferred approach in selected cases.

RÉSUMÉ

Le naevus flammeus provoque une défiguration grave. Etant donné l'éche du traitement conservateur, les possibilités de la chirurgie doivent être étudiées.

L'auteur expose ses résultats personnels. Il est convaincu que l'excision chirurgicale avec greffe, en dépit de ses limites, offre des possibilités impossibles à obtenir par d'autres moyens.

Le traitement chirurgical est plus délicat, ses risques sont plus grands, il exige des sacrifices de la part du malade; mais il reste le traitement de choix dans des cas sélectionnés.

RESUMEN

El naevus flammeus produce desfiguración grave, por la que los pacientes buscan atención. Ya que el tratamiento no quirúrgico es insatisfactorio, es necesario explorar las posibilidades quirúrgicas.

Revisando su propia experiencia con estos casos el autor considera que la extirpación y reconstrucción quirúrgica, a pesar de sus limitaciones ofrece mejorías que no pueden alcanzarse por otros métodos.

No puede negarse que el tratamiento quirúrgico aún cuando complejo y con riesgo, y de mandando mayor esfuerzo y sacrificio del paciente, sigue siendo el mejor medio de abordar ciertos casos.

SUMARIO

Naevus flammeus acarreta perturbações estéticas que invariavelmente levam os pacientes à consulta médica. Visto não ter sido satisfatória o tratamento não cirúrgico, as possibilidades cirúrgicas devem ser exploradas.

O autor por sua própria experiências em tais casos, está convencido que há exerese e a nova cobertura da área comprometida, apezar de limitações óbvias, oferece um grau de melhoria que não pode ser igualado por outros métodos.

Não pode ser negado que o tratamento cirúrgico embora mais complexo e perigoso, exigindo ainda mais esforço e sacrifício por parte do paciente, constitue o método preferível em casos selecionados.

RIASSUNTO

I nervo vascolari sanguigni sono causa di un notevole grado di deturpazione da cui i pazienti chiedono invariabilmente di essere liberati. Dato che i metodi di cura incruenta non hanno dato risultati soddisfacenti, è bene studiare quali possibilità abbia in questo campo la chirurgia. Rivedendo la propria esperienza, l'autore si dice convinto che la asportazione chirurgica del nervo e la relativa plastica offrono, malgrado alcune ovvie limitazioni, dei miglioramenti non ottenibili con altri metodi. Non si può comunque negare che la cura chirurgica, per quanto sia più complessa e richieda più sacrifici da parte del paziente, rimane la migliore in casi opportunamente selezionati.

ZUSAMMENFASSUNG

Der Naevus flammeus führt zu schweren Entstellungen, die den Kranken unfehlbar veranlassen, Hilfe zu suchen. Da die Behandlung mit nicht chirurgischen Verfahren unbefriedigend ist, wird eine Untersuchung der chirurgischen Behandlungsmöglichkeiten notwendig.

Eine Überprüfung seiner eigenen Erfahrungen bring den Verfasser zu der Überzeugung, dass trotz offensichtlicher Beschränkungen die Exzision und chirurgische Wiederherstellung der Haut zu Besserungen in einem Grade führen, die von keiner anderen Methode erreicht werden.

Es lässt sich nicht bestreiten, dass in ausgewählten Fällen die chirurgische Behandlung den Vorzug verdient, auch wenn sie komplizierter und riskanter als andere Verwahren ist und grössere Anforderungen an die Geduld und Opferwilligkeit des Patienten stellt.

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Use of Viable Intestinal Segments for Plastic Operations on the Urinary Bladder

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THE number of procedures designed for use on or replacment of the urinary bladder are so numerous that another approach may seem superfluous, yet it seems that the very multiplicity of such operations attests to their inadequacy. New advances in the fields of physiology, biochemistry, bacteriology and pharmacology have encouraged surgeons to attempt a more radical attack upon pelvic neoplasms. With these new advances, many procedures that were doomed to failure may now become feasible.

The procedure presented here incorporates several advantages over methods now in use. The surgical technic involved is relatively easy, with no need for ureteral anastomoses, and there is no fecal contamination. The bladder wall about the ureteral orifices is preserved to save the action of the intramural portion of the ureter. Thus the patient is able to void through the natural orifice and needs no bags or catheters.

Procedure.—Two methods of transplanting the small bowel to the trigone area were used in this study.

Method 1: For this experimental study, healthy male dogs weighing 25 to 30 pounds (9.1 to 11.3 Kg.) were given 1 Gm. of sulfathalidine and 400,000 units of penicillin daily for three days preoperatively. The dogs were starved for twenty-four hours before the operation.

With the animal under sodium nembutal anesthesia (1 cc. per 5 pounds [2.3 Kg.] of body weight) the abdomen was shaved and prepared with soap, iodine and alcohol before being draped with sterile sheets. The operating surgeons used sterile gloves. A midline incision with extension to the right side of the penis was used. When the peritoneal cavity was entered, a segment of small bowel close to the urinary bladder was selected. A segment with an adequately long branch of the mesenteric artery was usually observed to be ileum. This segment, about 8 to 10 cm. in length, was transected and its mesenteric artery freed down to the root of the mesentery. Both open ends of the bowel that remained after removal of the segment were inverted and closed, a two-layer inverting suture being used. The proximal and distal loops of bowel were anastomosed by a side-to-side technic to produce a stoma matching the bowel diameter in size. No. 3-0 chromic sutures were used on the mucosal layer and No. 3-0 silk on the serosal layer.

The isolated segment was opened along its antimesenteric border (Fig. 1*A*). Four silk stay sutures were inserted, one into each quadrant of the lower portion of the bladder, which was then amputated down to the trigone area. Bleeding points were clamped and ligated. The open bowel seg-

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Submitted for publication Dec. 29, 1955.

ment, with its mucosa intact, was anastomosed to the trigone with Connel No. 3-0 chromic suture and serosal interrupted No. 3-0 black silk suture (Fig. 1, *B* and *C*). The abdomen was closed in layers. The dog was given fluids the day after the operation, and antibiotics were continued for three days.

Method 2: Healthy dogs weighing 20 to 30 pounds (9.1 to 14.1 Kg.) were used in this series. Preoperatively the animals were given Neomycin, 1 Gm. orally, for three days. They were starved, except for water, for twenty-four hours prior to the operation. Intravenous sodium nembutal, 1 cc. per five younds of body weight, was used for anesthesia. The abdomen was shaved, prepared with tincture of mercresin and draped with clean nonsterile towels. Clean nonsterile gloves were used by the operating surgeons.

The abdomen was opened through a midline incision extending to the right of the penis. Bleeding points were clamped and ligated. The peritoneum was opened, and a segment of ileum about 20 cm. long was selected because of its proximity to the urinary bladder. The smaller branches of the blood vessels from the intestine were followed through the arcuate arteries to the root of the mesentery. These small branches were clamped and ligated as they were encountered, the segment of choice being completely isolated from the rest of the intestine. It was clamped and ligated and an end-to-end or a side-to-side anastomosis was done, the free intestinal segment being left with its own blood and nerve supply coming directly from the mesentery. A two-layer No. 3-0 silk suture was used throughout the procedure.

The proximal end of the isolated segment of intestine was inverted and closed, No. 3-0 silk sutures being used. We attempted to make the segment of bowel of such a length that it would hold the same volume of urine as the dog's bladder, approximately 75 to 150 cc. The bladder was transected at the trigone, the ureteral orifices being left intact. The distal end of of the isolated segment of ileum was anastomosed to the remaining stump of trigone, a No. 3-0 running chromic suture being used on the inner layer and a No. 3-0 running silk suture on the outer layer (Fig. 1*D*). The abdomen was closed in layers. The animals were given 500 cc. of saline solution subcutaneously after the operation, and water given by mouth was started the next day. They were given 400,000 units of penicillin daily for a week after the operation.

Results.—A series of 4 dogs was used with Method 1, Method 2 was used on 6 dogs. In each series there was 1 anesthetic death. Studies carried out on the 8 surviving animals included test for nonprotein nitrogen, urine cultures, intravenous pyelograms

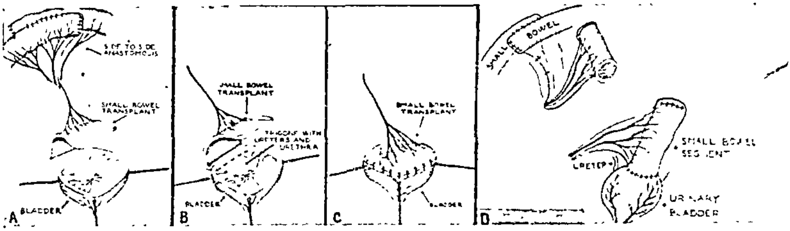

Fig. 1.—Operative procedure (see text).

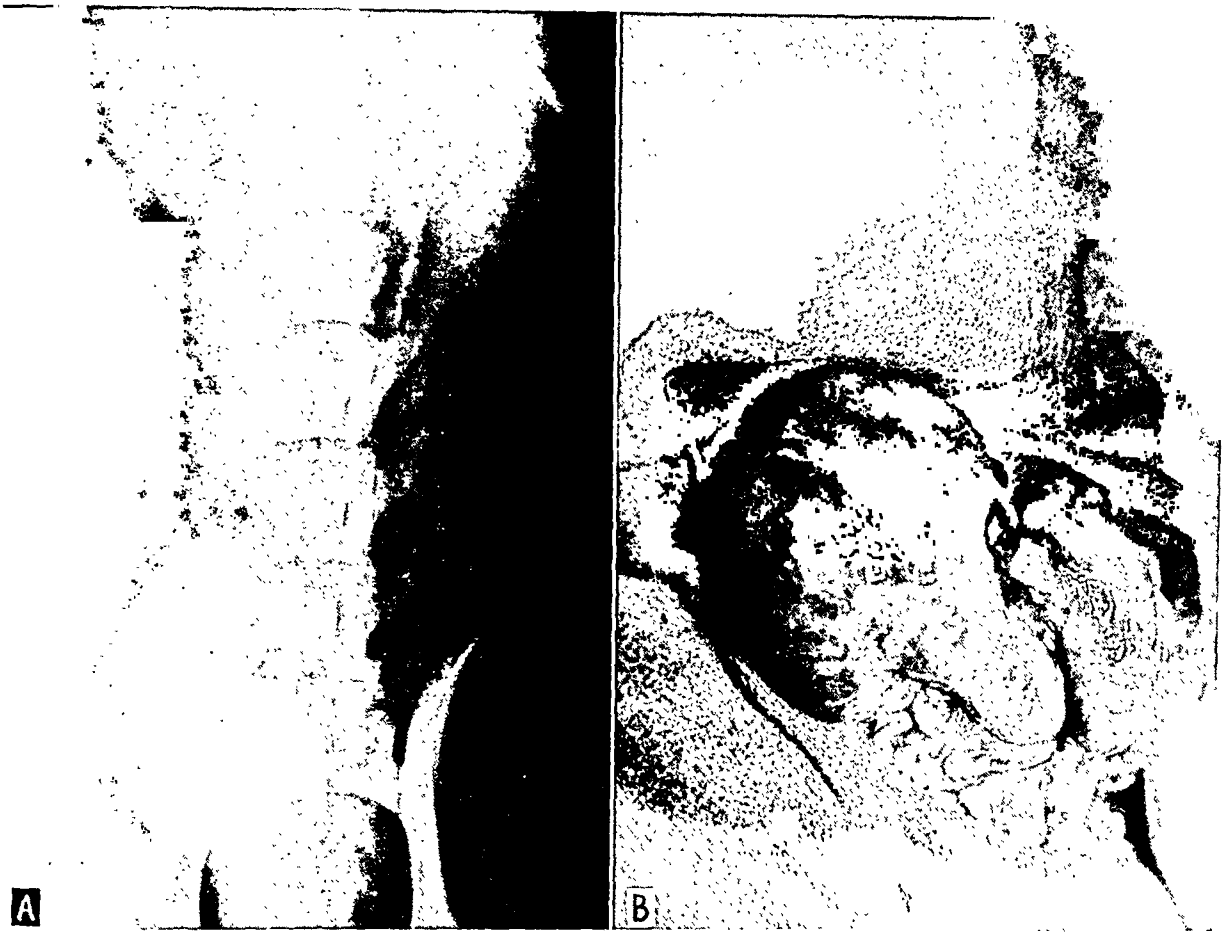

Fig. 2.—Intravenous pyelograms (see text).

and laparotomies with biopsies.

Preoperatively the upper limit of the nonprotein nitrogen values was 38 mg. per hundred cubic centimeters. For the first postoperative month they rose to 40 to 42.5 mg. per hundred cubic centimeters and then returned to the preoperative levels.

Postoperative urine cultures were negative for 6 of the animals. Cultures on the other two animals showed Aerobacter aerogenes. Microscopic studies of the urine on the animals with positive cultures showed 25 to 30 white cells and 8 to 12 red blood cells per high power field, disintegrated epithelial cells. Albumin was present in these specimens.

At six weeks, three months, and six months intravenous pyelograms, taken with the use of 20 cc. of 70 per cent Iopax, showed good concentration of the dye and no dilatation of the ureters. The trigone had become hypertrophied upward, so that within six weeks it was the size of the original bladder (Fig. 2*A*). The animals voided no more than usual. With Method 2 the intestinal segment contracted downward as the urinary bladder remnant became hypertrophied (Fig. 2*B*). Laparotomies were done at intervals of one and a half, three, six and twelve months. Biopsy specimens of the juncture of the bladder and the intestinal segment were taken and studied microscopically. At operation shreds of mucus were observed in the urine within the bladder. In 1 animal a number of bladder calculi had formed about the deeply placed nonabsorbable silk sutures.

Microscopically the mucous membrane of the intestine had undergone mucoid degeneration, and the villae contained goblet cells (Fig. 3*A*). The transition epithelium of the bladder tended to grow right over the intestinal mucous membrane (Fig. 3*B*). The hypertrophied bladder remnant, when filled and stimulated with the animal under barbiturate anesthesia, emptied but did not empty completely, as does a normal dog's. Davids and Bellwin[1] did not observe any hypertrophy of the bladder remnants as we did in our experiments.

COMMENT

Kirwin[2] classified the general types of treatment now available for bladder tumors into four groups: simple excision followed by cauterization or radon implantation; suprapubic or intraurethral excision; total cystectomy with ureteral transplant, and radium and roentgen therapy. The treatment utilized depends upon the type of pathologic condition present and its extent.

According to Milner,[3] Marshall's classification is concise and inclusive: Stage O, limitation of spread to mucosa; Stage A, limitation of spread to submucosa; Stage B_1, limitation of spread to superficial muscle; Stage B_2, limitation of spread to deep muscle; Stage C, limitation of spread to fat; Stage D, metastasis; Stage D_1,

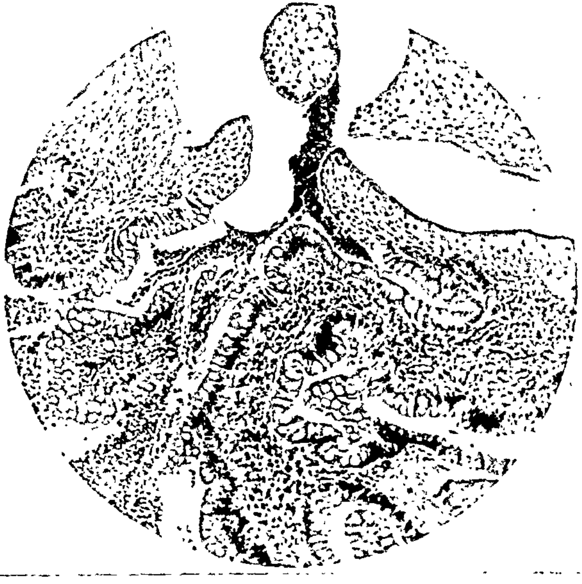

Fig. 3. (Dog 2).—Juncture of bladder and bowel wall.

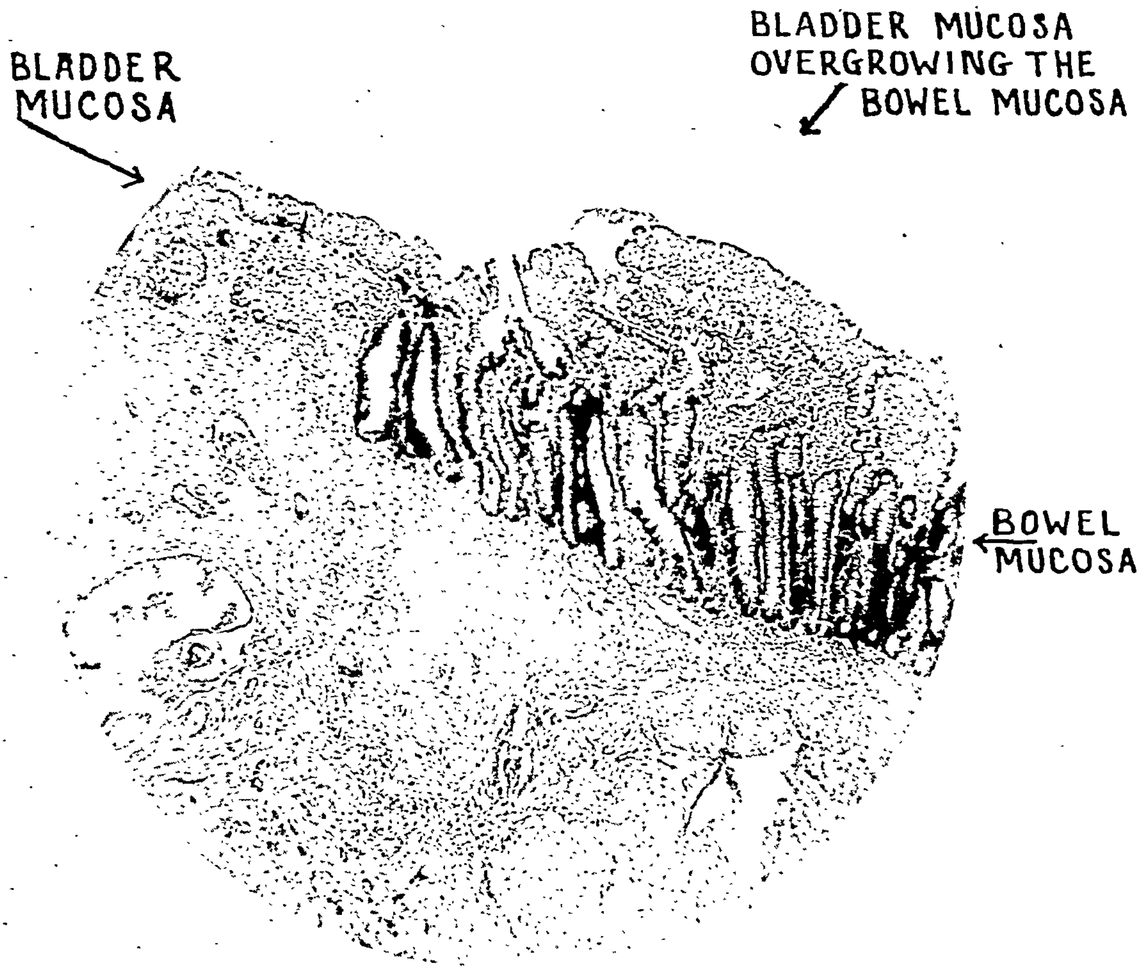

Fig. 4 (Dog 3).—Juncture of bladder and bowel mucosa, showing reepithelization of bowel transplant with transectional epithelium. × 125.

local, and Stage D_2, distant.

Patients with tumors of Stages O, A, B_1, and B_2 have shown a better survival rate under conservative therapy, while tumors of Stages C and D require radical operation with node dissection.

Viable intestinal segments, as well as other intra-abdominal structures, have been utilized in the past for plastic operations on the urinary bladder. Waltman Walters[4] reported in 1932, in the *Proceedings of the Staff Meeting of the Mayo Clinic*, that Walter Seberring in 1922 used a viable small bowel transplant for replacement of the dome of the bladder in a patient with a chemical injury to the bladder. He used whole segments of small bowel, up to 30 cm. in length, one open end of which he sutured to the defect in the dome of the bladder. The other end he closed. He was able to conclude that the bladder and small intestine healed with a firm scar of connective tissue. He stated also that the muscular activity of the bowel prevented any danger of diverticulum formation.

In 1925 Lay and others[5] reported attempts to use gallbladder transplants for the purpose of forming urinary bladders.

The work was unsuccessful because of the reported high urea absorption. Rubin[6] reported the formation of an artificial bladder from sigmoid. Bisgard and others[7] substituted an isolated segment of sigmoid colon for the bladder in a two-stage procedure, utilizing ureteral loop substitution for a total cystectomy in a one-stage procedure. Merricks[8] has utilized cecum for the bladder and ileum for the urethra. Barnes,[9] using an isolated segment of ileum on a monkey, reported that it resulted in a dilated atonic bladder.

We have excised the urinary bladder above the trigone and transplanted a segment of small bowel which was split along its antimesenteric border. Such a simple, rapid procedure seemed advantageous considering the fact that, as Milner[3] has pointed out, the average age of the patient with a bladder tumor is 60.1 and his general physical status is usually poor. Since 75 to 80 per cent of all bladder tumors occur in the posterior bladder wall near the trigone, this procedure would probably be adequate and would still leave the required 3 cm. "safety zone" of normal tissue that Drew[10] states should be left around the tumor when it is excised. If a ureter is involved, its normal end may be readily transplanted into the bowel segment.

Although surgical treatment of the urinary bladder is simplified by its excellent blood supply, its interlacing muscle bundles and a rather strong mucosa, the results of treatment thus far are poor. Colby[11] has pointed out that with muscle invasion the five-year survival rate is only 10 per cent; with no muscle invasion, it is 64 per cent. These results might be greatly improved if a simple procedure, such as the one presented here, encouraged the opening of the abdomen for close inspection of bladder tumors and more frequent early complete excision of bladder tumors from Stage A on down.

CONCLUSIONS

1. Viable segments of small bowel with blood and nerve supply intact can be anastomosed to the trigone of the bladder.
2. The bladder becomes hypertrophied over a period of time to the original normal size, but it does not empty completely.
3. The mucosa of the bowel transplant undergoes a mucoid type of degeneration.
4. The kidneys show no hydronephrosis or signs of pyelonephritis.
5. The nonprotein returns to normal after an initial elevation.
6. This procedure might readily be utilized for tumors or injuries of the bladder.

ZUSAMMENFASSUNG

1. Lebensfähige Abschnitte des Dünndarms mit erhaltener Blut- und Nervenversorgung können mit dem Lieutaudschen Blasendreieck anastomosiert werden.

2. Im Laufe eines gewissen Zeitabschnittes vergrössert sich die Blase zu ihrem ursprünglichen Umfang, es erfolgt jedoch keine völlige Entleerung.

3. Die Schleimhaut des Darmtransplantats macht eine Art mukoider Degeneration durch.

Die Nieren zeigen keine Zeichen von Hydronephrose oder Pyelonephritis.

5. Der Reststickstoffgehalt des Blutes kehrt nach einem anfänglichen Anstieg zur Norm zurück.

6. Das Verfahren lässt sich leicht bei der Behandlung von Geschwülsten oder Verletzungen der Blase anwenden.

RESUMEN

1. Los segmentos viables de intestino delgado con inervación y vascularización íntegra pueden anastomosarse al trígono de la vejiga.

2. La vejiga se hipertrofia por un tiempo pero no se vacía completamente.

3. La mucosa del [illegible] pla [illegible] intes

presenta degeneración de tipo mucoide.

4. Los riñones no muestran hidronefrosis ni signos de pielonefritis.
5. El nivel de nitrógeno no proteico vuelve a lo normal después de una elevación inicial.
6. Este procedimiento puede ser utilizado para tumores o lesiones de la vejiga.

RIASSUNTO

1. E' possibile anastomizzare al trigono vescicale dei segmenti intestinali forniti del loro circolo arterioso e dei loro nervi.
2. La vescica si ipertrofizza, ma non si svuota completamente.
3. La mucosa del tenue trapiantato va incontro alla degenerazione mucoide.
4. Non consegue idronefrosi nè pielonefrite.
5. L'azoto ureico ritorna alla norma.
6. Il metodo può essere usato nella cura di tumori o lesioni traumatiche della vescica.

SUMARIO

1. Segmentos viáveis de intestino delgado com inervação e irrigação intactas podem ser anastomosados ao trígono da bexiga.
2. A bexiga fica hipertrofiada durante certo tempo até ao tamanho normal original, mas não se esvazia completamente.
3. A mucosa intestinal transplantada sofre um tipo de degeneração mucóide.
4. Os rins não apresentam hidronefrose ou sinais de peilonefrite.
5. A taxa de azoto não protêico volta ao normal após uma elevação inicial.
6. Este método pode prontamente ser utilizado para tumores ou ferimentos da bexiga.

RÉSUMÉ

1. On peut anastomoser au trigone vésical des segments viables d'intestin grêle avec vascularisation et innervation intactes.
2. La vessie s'hypertrophie, mais ne peut se vider complètement.
3. La muqueuse du transplant intestinal subit une dégénérescence mucoïde.
4. Le rein ne montre pas d'hydronéphrose ni de signes de pyélonéphrite.
5. Le taux d'azote non protéique se normalise après une élévatio initiale.
6. Ce procédé pourrait être facilement utilisé pour les tumeurs ou les blessures de la vessie.

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Relation of the Orthopedic Surgeon to the Medicolegal Patient and the Courts

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THIS paper is presented in the hope that it will encourage doctors in general, and orthopedic surgeons in particular, to assume an expanding responsibility in one phase of medicine that too frequently in the past has been distasteful to physicians. As a physician, it is with some temerity that I approach the subject, the great majority of essays in this field having been prepared by attorneys at law. Our machine age, mixed with a changing social conscience and coupled with liability and workmen's compensation insurance as a catalytic agent, daily provides physicians with problems of legal import.

The physician's relation to the law and his responsibilities to a patient under the law date back to the Code of Hammaraubi,[1] the Babylonian, circa 2000 B. C. Under this code severe penalties were imposed upon a physician for his failures—the penalty being roughly parallel in severity with the standing in the community of the patient treated. Later, the Egyptians modified this responsibility and prescribed fundamental precepts that pertain even today. That is, a physician was absolved from liability in prosecution for malpractice because of failure to obtain satisfactory results so long as he prescribed established treatments for a disease. Here may I interject a thought on your responsibilities that is universally accepted in this country as stated by Wilkins[2]? "First: You represent to every patient whom you treat that you possess that degree of learning and skill ordinarily possessed by physicians (or surgeons, as the case may be) of good standing who are practicing in this state. Second: You undertake to exercise reasonable care and diligence and to use your best judgment in treating the patient."

Roman law further expanded the Egyptian philosophy, but it was still rather harsh toward physicians who were neglectful. It was not until 1532, during the reign of Emperor Charles V in Germany, that the first law was enacted to provide for the opinion of physicians in a medicolegal case. These foundations were further elaborated in English common law, with later additional refinements by our own courts and legislatures, to such an extent that the physician has become an integral part of medicolegal procedure today.

Any traumatologist today immediately subjects himself to the possibility of a legal procedure. Every injured patient is a potential legal litigant, who may require a physician to repeat factual information and conclude opinions of the significance of those facts in written reports to insurance companies, to attorneys at law, or before legal bodies. In general, the physician's relation to an injured patient falls into one of two categories: 1. He may be called upon to examine and treat a patient for curative purposes. This is the prime concern of the physician and is his traditional role. Subsequent legal circumstances become incidental, but none the less carve out a facet of importance in the duties of a doctor to his patient and com-

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Submitted for publication Oct. 11, 1954.

munity. Obviously it is unnecessary here to comment upon the manner of treatment, or the remarks made to the injured patient by the attending doctor, but the physician who manages a seriously injured patient should bear in mind the fact that his comments, his prescription and the results he obtains may be reviewed and evaluated by one of his colleagues before final disposition of the case. This first category includes any physician who serves as consultant to the attending physician of an injured patient. In the second category, the physician may be requested to examine an injured person to obtain facts and then to interpret them for a third person, such as a defendant in a personal injury case, or for an insurance carrier under the compensation laws of the state.

From the legal standpoint, the physician's relation and obligations to the patient in these two general categories differ to some extent. His records, in either instance, are invaluable. These records should be kept from the first moment of his responsibility and should be sufficient in detail to remind him, at any future time, of the medical circumstances surrounding the patient. In illustration, a small contusion of the head, associated with a period of unconsciousness, weeks later may explain headaches and other symptoms leading to a diagnosis of subdural hemorrhage, or simple recurrent headaches due to concussion. Further, a recorded contusion of a knee may support the subjective complaint of pain and soreness incident to an area of chondromalacia occurring as a sequela of that contusion. I am sure the legal circumstances surrounding so many patients, and the requirement of accurate record keeping, contributed much to the development of the Joint Accreditation Commission for Hospitals, which concerns itself considerably in this field. Information obtained from a patient, preparatory to treatment, invokes the restrictions of the commonly mentioned "doctor-patient privilege" statutes in those states which grant this privilege by legislative act. This information includes physical observations as well as oral disclosures. Compensation for service, or lack of it, in no way alters these legal restraints. The privilege of withholding information belongs entirely to the patient, and it may be waived expressly, or by implication, by him. Implied waiver of privileged communications is recognized in the following examples: "The patient himself calls the doctor to the stand and examines him regarding his physical condition—or a patient sends in a doctor's certificate as part of his claim for benefits under an accident insurance policy—or a patient sues for malpractice."[3] Workmen's compensation cases have been exempted in the states where legislatures prescribe this privilege. When a physician examines a plaintiff patient purely for the purpose of obtaining medical information and evaluating these observations at the instance of a defendant, he is free to communicate his information without restraint of privileged communications statutes.

At this point I should like to digress a moment and point out that the doctor's questioning of a patient at the instance of a defendant should be confined purely to medical matters. Obtaining information as to how the patient's injuries were incurred, except in a general way and insofar as the mechanics of an accident may assist in diagnosis, is a legal investigative matter outside the physician's province. Repetition of statements of this nature in court would be objected to as hearsay evidence. At the same time, if the physician reminds a patient that such matters are legal and that he is interested only in medicine, the patient is usually placed more at ease, is given a feeling of confidence and supplies the physician with more sincere medical information upon which an accurate report may be based. It is your duty to isolate his legal and monetary desires from his physical ills in your effort to give an accurate opinion of the patient's disabilities.

Occasionally, a physician receives through the mail a medical report blank accompanied with a brief polite request for completion for an insurance company or an attorney without properly signed authorization by a patient receiving treatment from him. Innocent completion and return of the blank, however accurate and well intentioned, without a waiver by the patient, imperils the physician. By the same token, however, acceptance of a patient for treatment obliges a physician to prepare reasonably prompt reports to his patient's private insurance company or to his patient's employer's insurance carrier under the compensation statutes. Until this is done, the patient will be denied the benefits of his claim. These reports may later become legal documents; hence, accuracy of their contents is essential. Inaccurate remarks in these reports expose the physician to criticism and possibly to public embarrassment in the courtroom. A written narrative report on behalf of a patient to an attorney should be informative in detail and simply stated, because it becomes the foundation of medical information in the preparation of that patient's legal claim. By the same token, these reports to a defendant's attorney in the same accurate detail are equally important. In the preparation of a report the use of superlatives should be avoided, because they are seized upon by an attorney in the courtroom to impress a jury when, as a rule, they are simply reiterations of statements made by the plaintiff. Furthermore, it is desirable to avoid vague descriptive terms, such as "some atrophy" or "a little limitation of motion," in the physical examination. When obtainable, accurate measurements of circumference of an extremity eloquently describe swelling or atrophy. The loss of motion in a joint is accurately determined by using a goniometer for angle measurement. Accurate, dependable medical reports conserve much of a physician's time, because they lead to satisfactory settlement outside the courtroom in a high percentage of cases. It is an axiom that a physician should never take sides. He is a scientist, who must collect the facts, interpret them with complete sincerity and, from then on, so to speak, "let the chips fall where they may."

In due course of time it becomes the duty of the physician in either of the aforedescribed circumstances to confer with the attorney to whom he has reported. The purpose of this conference may be most easily explained by the statement of an attorney whom I queried on this point: "To discuss the case with counsel and generally educate him as to some of the fine points of the case in advance of trial, and when requested to do so, point out to counsel both the strength and weakness of the case as related to the particular trauma giving rise to the claim."[4]

In one respect, in most states, patients applying for workmen's compensation must be reported upon in a different manner from that employed in cases of personal liability. Nearly all states have arbitrarily established monetary values upon certain disabilities, for the specific purpose of having a basis on which to settle industrial cases with a minimum of court procedure. Unfortunately, for a good many reasons, this involves much embarrassment to a physician who makes an honest effort to give an opinion in these cases. Few books have been written on the subject, and the few are not accepted by all of the several states or by all doctors called upon to evaluate disability. Furthermore, it is a subject that is given little or no attention in medical schools, either in the undergraduate or the postgraduate years. Most important of all, the human mechanism cannot be measured by instruments to determine its efficiency. Great benefit would result from the incorporation of a uniform course of instruction in the curricula of medical schools, to be followed by the promotion of fairly uniform state rating of industrial compensation disabilities.

Finally, in due course, the physician enters the courtroom as a witness. His appearance is prearranged, with or without subpoena. To most physicians the subpoena is extremely irritating; but it must be remembered that the instrument is a device of protection to the patient and to the attorney requesting its issue. Should the physician be detained by an emergency case, the proceedings of the court may be delayed, because of the subpoena, until the physician is produced to testify. Otherwise the case may be concluded without the benefit of his testimony, on which the outcome may be wholly dependent.

An attorney, on inquiry as to what he wished in a physician witness, replied: "My first desire is to have the best. By that, I mean a physician who is well-known and well-regarded in his community. Secondly, I want a physician whose honesty and integrity are above question. I also want a physician who can intelligently answer questions on the witness stand in such a manner that the jury understands them. Lastly, a witness must not become angry and lose his head when subjected to sometimes ridiculous cross-examination by opposing counsel."[5]

It is recognized that doctors are usually very busy men. They also live in a busy world of lawyers and judges. Another attorney pointed out to me that "the doctor who makes examinations and reports must be prepared to appear and testify on reasonable notice and not expect that all the other witnesses, the judge, the jury and the lawyers will always rearrange their time to suit his convenience."[6]

When he is seated in the witness box, the doctor will be at ease and his suspicion of the lawyers and the courts will be allayed if he will remember a few simple rules: 1. Obey fully and sincerely the oath "to tell the truth, the whole truth, and nothing but the truth." The truth is easy to remember for repetition. 2. Never answer a question until it is thoroughly understood. Frequently a witness is asked to answer "Yes" or "No." If the question cannot be answered in all honesty, without qualification, the doctor should inform the court. Furthermore, if at any time a medical witness is in doubt about answering a question, he may appeal to the judge. Usually the judge will then inform the witness of the legal implications, if any, involved in answering the question. 3. Never answer a question unless you are adequately familiar with the subject. A physician gains the respect of the court when he says he doesn't know the answer, instead of giving an evasive answer to cover up his lack of knowledge. 4. Do not go afield in answering a question. This applies especially to doctors who present before the court their qualifications as specialists in a certain branch of medicine. In medical testimony the physician's opinion as an expert is admissible in any field, but he must remember that the weight of his testimony is increased by his experience in the realm of the question. Opinion evidence is offered by one experienced in a subject to enlighten the court and assist it in applying facts so as to reach a correct conclusion. Dr. T. C. Wolff of the University of Maryland defined an expert medical witness thus: "A doctor of medicine, who restricts his testimony to subject matter wherein he has become familiar through years of interest as manifested by study, research or practice; that his competence in subject matter is known to his colleagues; and that his reputation for integrity has not been called into question."[7] 5. Answer all questions directly and briefly, in ordinary language. Narrative detailed answers should be given only upon request, unless it is essential to make one's reply clear to the jury. The doctor should never answer a question from the standpoint of an arbiter. This is the prerogative of the jury. 6. Make sure of a suitably dignified appearance. A physician who appears as a witness should dress and conduct himself in a professional manner.

To expect remuneration for services performed in the treatment of a medicolegal patient, or purely for evaluation by examination and appearance in court, does not differ in principle from expecting payment for any other service a doctor performs. The time, effort and service given should determine the fee. On occasion, a predetermined fee can be made embarrassing on the witness stand by an attorney who has little else to talk about. The jury realizes that the physician anticipates being properly paid for his services. A doctor should discuss the fee with the attorney, employing him if asked to do so. Doctors and attorneys of good repute understand each other sufficiently to make the prearrangement of fees unnecessary. Arrangement for a fee upon a contingency basis is illegal, for obvious reasons.

Discussion of malpractice has been deliberately avoided in this presentation because it is a subject in itself and is not directly related to the categories discussed.

SUMMARY

A physician who treats or examines an injured patient must carefully prepare for a day of accounting in the court, because he has become recognized as an integral part of the court retinue in the final reckoning of the case. The relation of the doctor to the injured patient whom he treats is simply a traditional association with the legal element added. His relation to a patient whom a doctor has examined for a "third party" should be strictly professional, followed by straightforward reporting, so that his scientific competence and integrity may never be brought into question.

ZUSAMMENFASSUNG

Der Arzt, der einen Unfallskranken behandelt oder untersucht, muss darauf vorbereitet sein, dass er eines Tages vor Gericht einen Rechenschaftsbericht abgeben muss, weil er anerkanntermassen eine unentbehrliche Rolle bei der endgültigen gerichtlichen Regelung des Falles spielt. Die Beziehungen des Arztes zu den von ihm behandelten Unfallsverletzten unterscheiden sich von dem traditionellen Verhältnis zwischen Arzt und Krankem nur dadurch, dass das gerichtliche Element hinzutritt. Die Beziehung des Arztes zu einem Kranken, den er für eine "dritte Partei" untersucht hat, müssen auf streng professioneller Basis beruhen und zu einer ehrlichen Berichterstattung führen, sodass die wissenschaftliche Tauglichkeit des Arztes und seine Integrität niemals in Frage gestellt werden können.

RÉSUMÉ

Le médecin qui traite ou examine un blessé doit prévoir d'être appelé à témoigner un jour devant les tribunaux. Il peut être considéré par les tribunaux comme médecin traitant ou comme médecin expert. Comme médecin traitant, il aura vis-à-vis de la justice le secret professionnel, tandis que pour le médecin expert, secret professionnel

RIASSUNTO

Data l'importanza che il suo referto ha nella definizione finale del caso, un medico che esamini e curi un traumatizzato deve accuratamente prepararsi per il giorno di udienza. Le relazioni fra medici e traumatizzato sono quelle tradizionali fra curante e ammalato, con in più elementi legali. Le relazioni fra un medico e un paziente già esaminato da un altro medico di parte debbono essere strettamente professionali e la relazione dovrà essere improntata alla massima correttezza ed obbiettività in modo che non possano mai andarvi di mezzo nè la competenza scientifica nè l'integrità morale.

RESUMEN

El médico que examina y trata al paciente traumatizado debe prepararse cuidadosamente para un día de cita en la corte, y que el está reconocido como una parte integral de la corte para el expediente final del caso. La relación del doctor con el paciente traumatizado que trata es simplemente una asociación tradicional con un elemento legal. La relación del paciente que ha sido examinado por un doctor para una tercera parte, debe ser estrictamente profesional seguida de una comunicación, de manera que su capacidad científica e integridad no puede ponerse en evidencia nunca.

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The worst sorrows in life are not in its losses and misfortunes, but its fears.

—*Benson*

The question for us is . . . whether our fears will feed on themselves until we throw away our freedom in a wild attempt to preserve it. There is a great threat from overseas. But the threat here at home is, for the moment, greater.

—*Bush*

Clinical and Pathologic Differences Between Regional Enteritis and Ulcerative Colitis

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REGIONAL enteritis and ulcerative colitis are similar diseases, but they present specific clinical and pathologic differences.

First noted as an inflammatory disease of the bowel in 1806 by Coombe, regional enteritis was obscure until 1932, when Crohn and others described the disease and reported 12 cases. In 1939, Hadfield recognized the granulomatous character of regional enteritis.

Chronic ulcerative colitis was first described in 1875 by Wilks and Moxon. Allchin in 1885, Hewitt in 1915 and Buie and his co-workers in 1932 made further classic contributions to its recognition.

Regional enteritis is confined to the small intestine in 85 per cent of cases, and in the other 15 per cent there is involvement of the colon. Ulcerative colitis is confined to the colon in 66 per cent of cases, with ileal involvement in the remaining 34 per cent, resulting in ulcerative ileocolitis.

Clinical Differences.—Ulcerative colitis, judged on the basis of general hospital admissions, is 30 to 40 times as common as is regional enteritis, and is more often encountered in the female than in the male. In contrast, 56 per cent of regional enteritis occurs in the male.

Ulcerative colitis has a peak incidence in patients between 30 and 40 years of age, while regional enteritis is most common in the 20 to 30 year age group. Both diseases, however, have been reported as occurring in patients from 1 to 70 years of age.

Symptomatically, regional enteritis is an inflammatory disease of the small intestine characterized by abdominal cramps, diarrhea, fever, anemia, loss of weight and anorectal complications. Ulcerative colitis is also an inflammatory disease, occurring for the most part in the large intestine and characterized by bloody diarrhea, abdominal cramps, loss of weight, and anorectal complications. Enteric and abdominal fistulas are more common in cases of regional enteritis, while anorectal infections are more commonly associated with ulcerative colitis. Rectal bleeding occurs more commonly in ulcerative colitis. Abdominal cramps several hours after meals are more often a symptom of regional enteritis than of ulcerative colitis. Relief of abdominal cramps after defecation is a common observation in cases of ulcerative colitis.

Three prominent signs occurring in cases of regional enteritis are (a) a tender, fixed mass in the lower part of the abdomen; (b) irregular fever, and (c) negative results from sigmoidoscopic examination. Positive sigmoidoscopic abnormalities, however, caused by small discrete ulcerations, have been described as occurring in 8 per cent of patients with regional enteritis. These ulcerations may produce strictures.

Two prominent signs associated with ulcerative colitis are abdominal tenderness

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Dec 21, 1954.

over the colon and positive results from sigmoidoscopic study.

When present, diagnostic roentgen signs of regional enteritis consist of the "string sign," a distorted, narrowed, irregular lumen with loss of the mucosal pattern. In cases of ulcerative colitis, the diagnostic roentgen signs, when present, consist of the "lead pipe" colon, a shortened, smooth, rigid colon wth loss of haustral markings.

The laboratory data are helpful. Anemia is present in 75 per cent of cases of regional enteritis, usually microcytic hypochromic, and is more commonly associated with regional enteritis. Hypoproteinemia, hypocalcemia and hypoprothrombinemia are more commonly coexistent with regional enteritis than with ulcerative colitis. In some, but not all, cases of regional enteritis the stools show an elevated fat content. Lysozyme values are higher with ulcerative colitis, and abnormal results from liver function tests are commoner with ulcerative colitis.

The complications most frequently encountered in cases of regional enteritis are appendicitis, intestinal obstruction, anemia, enteric abscesses and fistulas, deficiency states, arthritis and dermatitis. The most frequent complications of ulcerative colitis are chronicity, hemorrhage, ulceration, inflammatory polyp formation, anorectal infections, electrolyte imbalance and perforation of the colon. The incidence of carcinoma of the colon complicating ulcerative colitis is higher than normal—as high as 14 per cent, as compared with an incidence of 0.8 per cent in the general population. This is a marked contrast when compared to the virtual absence of carcinoma in persons with regional enteritis.

Principal Pathologic Features.—Observed grossly, the small intestine in a case of regional enteritis is reddish-purple to grey, thickened and suggestive of a rubber hose. The mesentery is stiff and edematous. White granular nodules may be visible, and enlarged lymph nodes palpable, in the mesentery. The opened specimen of small intestine appears cobbled, congested and dusky red. On closer inspection longitudinal ulcerations are seen, at first obscured by edematous, overhanging mucosal ridges. The ulcerations occur typically in a mesenteric location and are not as grossly apparent as with ulcerative colitis. "Skip areas" may be noted, with ulcerations occurring some distance away from the main lesion. Adhesions, abscesses and fistulas are present in more than half of the surgical specimens. Distended bowel proximal to obstructed segments often obscures involvement that becomes apparent when the specimen is opened. Stercoraceous ulcerations may be observed in obstructed, distended bowel as a secondary process and, in contrast to the ulcerations of regional enteritis, tend to be shallow and antimesenteric in location. The disease progresses in a proximal direction from the terminal portion of the ileum, microscopic involvement taking place before gross change is apparent to the surgeon. Isolated lesions of regional enteritis, however, have been reported as present in all parts of the small intestine, including the duodenum, and also in the colon.

Grossly, the large intestine involved in ulcerative colitis presents a much different picture In contrast to the specimen in a case of regional enteritis, the colon may show little external abnormality to suggest the extensive mucosal changes. Unusual redness or spasticity may be the only external manifestation at operation. The mesentery may be normal, with few enlarged lymph nodes, unless the disease is advanced or complicated by carcinomatous change.

The most striking change will be noted on examining the colonic mucosa. The entire lining often appears diffusely congested, ulcerated and inflamed, with the ulceration occurring in an antimesenteric distribution, most noticeable along the taemia coli. Between the ulcerations the mucosa is bright red and edematous. Frequently the mucosa is denuded except for scattered elevated patches of epithelium. Narrow pedicles may be present, coalescing to form small mucosal bridges. The process tends to be diffuse, involving continuous areas of colon, and 75 to 80 per cent of surgical specimens show involvement from the rectum to the hepatic flexure. Ulcerative colitis restricted to the right half of the colon is rare, occurring in less than 5 per cent of cases.

In the presence of regional enteritis the gross pathologic changes are referable to the early inflammatory stage and later to the fibrotic, reactive phase. The ulcerative phase predominates in the early stage of the disease, progressing subsequently into a hyperplastic stage. Hypoproteinemia and enemia attend the ulcerative form, while obstruction and fistulas accompany the hyperplastic form.

In the presence of ulcerative colitis, pathologic changes are similarly related to the duration of the disease, with ulceration more prominent in the initial phase and scarring, atrophy and pseudopolyps prominent in the advanced stage. Pseudopolyps, which are observed in approximately 20 per cent of cases, usually indicate a duration of five or more years, but the absence of pseudopolyps does not necessarily imply a duration of less than five years.

With respect to microscopic pathologic changes, it is recognized that the chief change attributable to regional enteritis is progressive sclerosing granulomatous, lymphangitis affecting all layers of the small intestine, the lymph nodes and the mesentery. In contrast, ulceration, which is the chief change associated with ulcerative colitis, is restricted mainly to the colonic mucosa and submucosa.

In cases of regional enteritis, the most characteristic microscopic change occurs in the submucosa, in the formation of tuberculoid giant cells, accompanied with interstitial edema, lymphoid hyperplasia and lymphatic distention to account for the gross prominence of the submucosal layer. Other characteristic microscopic changes include a pronounced increase of epithelial goblet cells at the expense of other histologic structures and variable ulceration often extending past the tunica propria into deeper layers, with destruction of villi. The muscularis mucosae is thickened with typical collections of inflammatory cells. The muscularis propria becomes hypertrophic from obstruction rather than inflammation. Changes in the serosal layer are a continuation of those in the submucosa. Similarly, interstitial edema, lymphatic distention, isolated tuberculoid giant cells and lymphoid hyperplasia comprise the histopathologic changes observed in the mesentery. It should be emphasized that the tuberculoid giant cell granuloma of regional enteritis does not have the central caseous necrosis or the acid-fast bacilli that distinguish tuberculous lesions. The tuberculoid giant cells of regional enteritis, in addition, undergo sclerosis and hyaline change, in contrast to acid-fast tubercles. The giant cells of regional enteritis do not tend to resolve or permit reestablishment of lymphatic drainage. Also, the tuberculoid cells of regional enteritis are observed to contain granules reacting to Sudan stains for fat. Tuberculoid giant cell granulomas, with these six differential characteristics, are found in three-fourths of the cases of regional enteritis, mainly in the enlarged lymph nodes.

It is generally agreed that the primary pathologic process of regional enteritis consists of an increase of goblet cells, with ulcerative, lymphatic and giant cell changes, while other changes (interstitial edema, monocytic, polymorphonuclear, and eosinophilic infiltration) represent secondary processes. The formation of giant cells is considered due either to lymphatic endothelial proliferation or to independant aggregations of monocytes. Inflammatory disturbances are observed in the perivascular structures, interfering with the blood supply, and in the perineural lymphatics, interfering with peristalsis.

In contrast to regional enteritis, the microscopic changes of ulcerative colitis are restricted mainly to the mucosa and the submucosa. The primary pathologic process in ulcerative colitis consists of an unusual exudative inflammation, resulting in crypt abscesses of the mucosa. Aggregates of such mucosal crypt abscesses rupture into the submucosa, dissecting and separating portions of mucosa from its blood supply, with resultant slough and ulceration. Later, fibrosis and attempted regeneration follow. It has been observed that, when ulcerative colitis involves the ileum, the same changes occur in the colon but no granulomas are formed; this indicates the basic difference between the two diseases. In about half of all cases of ulcerative colitis, nonspecific changes (shallow mucosal ulceration, fibrosis and infiltration) obscure the primary pathologic changes otherwise demonstrated. The lymphadenopathic picture of ulcerative colitis, much less prominent than that of regional enteritis, demonstrates hyperplasia, inflammation and, in advanced stages, a fibrous thickening of lymph node capsules not observed with regional enteritis. In about 10 per cent of cases of ulcerative colitis, the same pathologic changes occur to a more fulminating extent, with deeper ulceration. In addition, in these cases, there is inflammatory necrosis of the blood vessel walls, leading to vascular occlusion with infarction of part or all of the colonic segment, resembling the changes observed with collagen diseases. This type of colitis has been referred to as "colitis gravis," having a fulminating course, and, with combinations of focal vascular lesions, the term "vasculitis colitis" has been applied. In about 1 per cent of cases the patient has both regional enteritis and ulcerative colitis, with the result that the pathologic features associated with both diseases are present.

SUMMARY

Clinical and pathologic differences exist between regional enteritis and ulcerative colitis. These differences are described. The pathologic differences demonstrate greater contrast than do the clinical differences.

RÉSUMÉ

Il existe des différences cliniques et pathologiques entre les entérites et les colites ulcéreuses. Elles sont décrites. Les différences pathologiques montrent des contrastes plus grands que les différences cliniques.

ZUSAMMENFASSUNG

Es bestehen klinische und pathologische Unterschiede zwischen der regionalen Enteritis und der ulzerativen Kolitis. Diese Unterschiede werden beschrieben. Die pathologischen Verschiedenheiten sind auffälliger als die klinischen.

RESUMEN

Existen diferencias clínicas y patológicas entre la enteritis regional y la colitis ulcerativa. Se describen estas diferencias. Las diferencias patológicas muestran un gran contraste con relación a las diferencias clínicas.

RIASSUNTO

Vi sono, e vengono descritte, le differenze anatomo-patologiche e cliniche esistenti fra enteriti regionali e coliti ulcerose. Le differenze anatomo-patologiche sono assai più evidenti di quelle cliniche.

Section on Ophthalmology and Otorhinolaryngology

PAUL C. CRAIG, M.D., F.A.C.S., F.I.C.S., EDITOR

Ménière's Disease

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THE term "Ménière's disease" is applied to a disease of the ear, the symptoms of which are clear cut. The patient complains of recurring "dizzy spells" associated with a fluctuating type of deafness and tinnitus. The attacks of dizziness or vertigo are often the primary complaint because they are so disabling and distressing, but the constant and diagnostic features of the disease are the auditory disturbances. The diagnosis is based mainly on the type of hearing loss, the nature of the tinnitus and other auditory disturbances.

Auditory Disturbances.—Ménière's disease commonly begins after the age of 40, but not always. Occasionally in the earlier years the hearing loss primarily affects the threshold for low tones. The degree of hearing loss fluctuates; the patient is aware that he can hear much better at some times than at others, and this variation in the threshold can be confirmed by hearing tests. The tinnitus due to Ménière's disease is the buzzing or roaring type as distinguished from the high-pitched hissing tinnitus that goes with high tone deafness. The intensity of the tinnitus varies directly with the fluctuations in the hearing threshold. When Ménière's disease appears in elderly persons it is frequently superimposed on bilateral high tone deafness or primary nerve degeneration.

A sense of "blockage" in the ear and sometimes of a pain in the same area is also characteristic and varies in intensity with the hearing loss and tinnitus.

The affected ear is usually sensitive to loud sounds. Although the threshold may be greatly impaired, the patient often cannot tolerate loud noises in the diseased ear. Often there is diplacusis.

A characteristic of Ménière's disease is that as the intensity of sound is increased above the threshold level the loudness as sensed by the patient increases more rapidly than in a normal ear. This is called recruitment. It often happens that a sound of high intensity may seem louder in the diseased ear than in the other, in spite of the fact that there is a marked threshold loss of hearing. This characteristic can be measured, when the condition is unilateral, by a test known as the loudness balance test, devised by Fowler.

Another feature of the hearing loss in Ménière's disease is the fact that the patient's ability to understand speech does not improve as the speech is made louder

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

Submitted for publication Oct. 20, 1954.

The patient understands speech equally well, or better, when it is delivered only slightly above his threshold than when it is delivered at higher intensities. This factor interferes with the benefit to be obtained from a hearing aid, which *ipso facto* makes the sound louder. This also explains why patients with bilateral Ménière's disease do not wish to be spoken to in a very loud voice, since the understanding of speech may actually decrease as the intensity of the sound is increased.

In the presence of uncomplicated Mèniére's disease the function of the eustachian tube and middle ear is normal. The symptoms, however, are somewhat similar to those produced by a blocked eustachian tube.

Character of Vertigo.—The vertigo associated with Ménière's disease occurs typically in attacks. The onset is usually rapid and occasionally so abrupt as to cause falling. The severity and the duration vary greatly. In the severe attack there are nausea and vomiting, sometimes diarrhea. The attack usually ends fairly abruptly, and the patient is then free from further dizziness until the next attack. Occasionally a sense of mild lightheadedness may persist between attacks, but this is not the general rule. The affected labyrinth is usually responsive on the routine tests, which is a salient point in differentiating Ménière's disease from a tumor of the eighth nerve or of the cerebellopontine angle.

Pathologic Picture. — The pathologic change in the inner ear was first discovered by Hallpike and Cairns in 1938. It consists of a disturbance in the fluid system of the inner ear, in which all of the sense organs are located. The disturbance consists of dilatation of the endolymphatic fluid system, known as hydrops of the endolymphatic spaces. This affects different parts of the labyrinth, depending upon the nature of the walls. The cochlear duct is always affected. The saccule and vestibule are affected to a lesser extent.

Etiologic Factors. — The cause of this type of hydrops of the labyrinth is not yet clear. It would appear that a disturbance must occur in the mechanism that produces endolymph. The nature of this disturbance is not clear, nor, in fact, is the exact mechanism of secretion or production of endolymph definitely established. A possible explanation is that a disturbance in the chemical constitution of endolymph occurs, with an increase in nondiffusable molecules to account for an increase in osmotic pressure. This would result in the accumulation of fluid within the endolymphatic spaces. The most prevalent opinion at present is that a disturbance in the nervous control of the vascular system in the ear may be involved. Some clinical evidence that may favor this assumption is afforded by the frequent observation that nervous fatigue, anxiety or tension seem to aggravate the condition clinically. It is thought that these factors may give rise to a disturbance in the neurovascular mechanism.

Differential Diagnosis. — Such conditions as labyrinthitis due to infection of the middle ear or concussion of the labyrinth due to severe blow in the region of the ear are easily differentiated from Ménière's disease. The main conditions that are often confused with it are as follows:

Toxic Neuritis or Neurolabyrinthitis: Many virus diseases seem to have an affinity for the inner ear. The best examples are mumps, measles and typhus. The onset of dizziness and deafness in the presence of a virus infection that involves the ear is likely to be rapid and to produce permanent and sometimes profound damage of the hearing. Dizziness may be less pronounced. It usually consists of a single attack with gradual recovery and may be associated with other evidence of an infectious process. Some bacterial infections may also have a toxic effect on the inner ear.

Vascular Accident in the Labyrinth: Hemorrhage or thrombosis affecting the vascular supply to the inner ear may produce a sudden onset of deafness or dizziness, or both, referable to an ear that has previously been healthy. This happens usually in elderly persons, in the presence of known arteriosclerosis or hypertension. It is usually a single attack, producing varying degrees of permanent functional damage. Recovery from vertigo is gradual.

Vascular Spasm: It is not uncommon for young persons (in the second and third decades of life) without previous ear trouble to have a sudden onset of high tone hearing loss and deafness in one ear. Again it is a single attack and may occur without any detectable related disease. The cause is not known.

Dizziness Without Auditory Disturbance: It is a common occurrence to have patients complain of dizziness without any auditory disturbance. There may be a single attack or, in a few cases, repeated attacks. More frequent is a complaint of postural vertigo that persists for weeks or months without evidence of any disease of the central nervous system. The diagnosis of Ménière's disease cannot be made without the presence of hearing impairment and tinnitus. It is possible to make a diagnosis of Ménière's disease or hydrops of the labyrinth in the absence of vertigo when the characteristics of the disturbance of hearing correspond to those already outlined for Ménière's disease. Patients with Ménière's disease frequently go for months and even years without attacks of dizziness. It is not possible, however, to diagnose Ménière's disease on the basis of vertigo alone.

Treatment. — The treatment of Ménière's disease has undergone many changes. In the absence of definite knowledge as to the cause, the various treatments have had to be based on theories rather than on factual knowledge.

Medical treatment in recent years has been influenced by the theory that salt (sodium chloride) is a factor in aggravating Ménière's disease. Recent clinical investigations have created some doubt as to whether a low salt diet has any effect. Vasodilator drugs have been recommended and widely used, on the basis of the theory that a vascular spasm or other disturbance in circulation may be involved and may be favorably affected by periodic vasodilation. Nicotinic acid has been a favored drug. Drugs that affect the autonomic nervous system directly, such as banthine, have been tried. The results have been questionable. An interruption of the sympathetic nerve supply to the ear has been attempted by means of either stellate ganglionectomy or procaine injection of the sympathetic chain in that region. Results of this type of treatment also have been indefinite.

Clinical observations have indicated that any measures that can be taken to reduce nervous tension and promote regular habits of work, rest and eating appear to have a beneficial effect on the disease. It may well be that these factors constitute the most important part of the medical care available at present.

In approximately 90 per cent of cases, Ménière's disease is unilateral. In a small proportion, possibly less than 10 per cent, the vertigo may be so severe as to be disabling. For these patients consideration of surgical treatment is justifiable. Operation is aimed only at prevention of dizziness. Two types of procedure are most worthy of consideration: 1. Section of the vestibular nerve. This is an intracranial procedure and carries with it a degree of risk that has caused most surgeons to advise the procedure only reluctantly. 2. Destruction of the inner ear or labyrinth. Several types of operation have been recommended, but thus far experience has indicated that complete destruction of cochlear and vestibular function offers the most satisfactory results.

SUMMARY

The symptoms, causation, pathologic picture, diagnosis and treatment of Ménière's disease are discussed. Surgical intervention is recommended when vertigo, one of the principal symptoms, is so severe as to be disabling. The author suggests two types of procedure as suitable: (a) section of the vestibular nerve and (b) destruction of the inner ear or labyrinth.

RESUMEN

Se discuten los síntomas, etiología, cuadro patológico, diagnóstico y tratamiento de la enfermedad de Meniere. Se encuentra recomendada la intervención quirúrgica cuando uno de los síntomas principales, el vértigo, es tan grave que produce incapacidad. El autor sugiere dos tipos de procedimientos: (a) sección del nervio vestibular y (b) destrucción del oído interno o laberinto.

RÉSUMÉ

Les symptômes la cause, le tableau pathologique, le diagnostic et le traitement de la maladie de Ménières sont discutés. L'intervention chirurgicale est recommandée lorsque le vertige, un des symptômes principaux, provoque une incapacité de travail. L'auteur propose deux méthodes de traitement: a) section du nerf vestibulaire; b) destruction de l'oreille interne ou du labyrinthe.

RIASSUNTO

La malattia di Menière viene considerata dal punto di vista etiopatogenetico, anatomo-patologico, sintomatologico, diagnostico e terapeutico. La cura chirurgica deve essere presa in considerazione quando le vertigini, uno dei sintomi principali, siano tanto forti da impedire la partecipazione alla vita attiva. Due sono i metodi chirurigci convenienti: a) la sezione del nervo vestibolare; b) la distruzione del labirinto.

ZUSAMMENFASSUNG

Symptome, Ursache, Krankheitsbild, Diagnose und Behandlung der Menièreschen Krankheit werden erörtert. Chirurgisches Eingreifen wird empfohlen, wenn der Schwindel, eines der wesentlichen Symptome, so stark ist, das er zur Invalidität führt. Der Verfasser hält zwei Methoden des chirurgischen Eingriffs für geeignet, nämlich die Durchschneidung der Vestibularnerven und die Zerstörung des inneren Ohres oder des Labyrinths.

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It is the great destiny of human science, not to ease man's labors or prolong his life, noble as those ends may be, nor to serve the ends of power, but to enable man to walk upright without fear in a world which he at length will understand and which is his home.

—*Sears*

The Tonsil

Indications and Contraindications for Tonsillectomy; Surgical Technics

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SINCE the advent of antibiotic medication, therapeutics and surgical indications have radically changed. The information and knowledge derived from the medical literature and from actual clinical experience is abundant and frequently contradictory. Hence contemporary medicine is in a fluid state.

"Tonsils" and "adenoids" are terms that *explain only the nature and location of* these structures. "Waldeyer's ring" is more expressive, because it encompasses the tonsils, the adenoids, the lingual tonsil and the pharygeal lymphoid tissue. The literature on Waldeyer's ring is plentiful, but it has deviated from standards set up in recent years. One must alter one's ideas along with the changing times. It behooves all surgeons to restandardize their concepts as to the indications and contraindications for tonsillectomy, adenoidectomy or operations on Waldeyer's ring.

It has been definitely established that the tonsils and adenoids have certain physiologic functions. They are intimately related to the hematopoietic system—reticuloendothelial cells, lymphocytes, fibroblasts, mast cells and histiocytes, which are important in establishing immunity. It was recently noted that the plasma cells are extremely active in immunity, second only to the phagocytes.

An interesting observation is that the *tonsil, for the first month after birth, is* free of bacteria as well as any of the defensive hematopoietic structures. A *well-known fact is that Waldeyer's ring is* strategically situated and is exposed to air, food and micro-organisms. Under certain *conditions it affects and infects the structures* with which the organisms may come in contact. Every organ in the body has a specific function. Sooner or later the organ may become affected and/or infected, and surgical intervention is necessary. In the tonsil, for example, various cells begin to appear in the crypts as soon as infection occurs. The infection may involve the tonsil and adenoid exclusively or may act as a trigger point for toxemia. It may not be a source of focal infection, but it can certainly be considered the portal of entry.

In considering the unsolved problem of treating tonsils and adenoids, one is faced with innumerable questions: Shall we depend exclusively upon antibiotic therapy? Isn't it possible that antibiotics may not affect the live tissue as actual infection does? It is known that antibiotics do not produce immunity or localization, and therefore latent and residual subclinical infection may remain deep in the tonsil and adenoid structures. Is it possible that the inflammation remains

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Sept. 24, 1954.

owing to the antibiotics? Is post-tonsillar and adenoid bleeding due to failure of localization during infection? Is there merit in tonsillectomy? Should we be placid and allow the tonsils and adenoids to remain despite infection? Shall we remove the tonsils and adenoids? Are they better in or out? Has nature, or God, if you please, put them there for a physiologic purpose? Should we underestimate the operative procedure and call it a minor intervention? Is there a logical explanation for the diminishing vogue of tonsillectomy and adenoidectomy? Is it due to poor or indiscriminate operations, improper selection of cases, bad physical risks, morbidity and occasional mortality? Or can we attribute it to the changing times? These are the questions surgeons must ask themselves.

When one considers the fact that the astronomic number of 2,000,000 tonsillectomies and adenoidectomies are performed annually in the United States and only 15 per cent are performed by qualified Board men, the profession can certainly consider itself fortunate that there are so few complications. I hesitate to make this statement, but the tonsil controversy seems to be a free-for-all, and the motto is "every man for himself."

Treatment of the tonsils and adenoids today, therefore, is a moot question. Many physicians are sincere and honest in their convictions for or against tonsillectomy. Too many have simply jumped onto the bandwagon for the sake of notoriety or have floated along with the tide.

One finds oneself buffeted by the pediatrician, the general practitioner, the psychiatrist, the psychologist and the lay press. In the summer one is confronted with the threat of poliomyelitis and allergy; in the winter one is handicapped by inclement weather and the prevalence of virus infections, infections of the upper part of the respiratory tract and influenza.

Pediatricians have diversified opinions as to the proper age for tonsillectomy and adenoidectomy. I cannot altogether fathom why some pediatricians regard the age of 5 years as the propitious time, while others insist that the age should range up to 10 years. Otolaryngologists have noted that those pediatricians who perform tonsillectomies and adenoidectomies have a much more liberal attitude as to the suitable time and age for operation. On the other hand, the pediatrician has the privilege of watching the child grow, and he is therefore best qualified to know the indications and the feasible time for tonsillectomy and adenoidectomy. Age is not an important factor when infection exists and when there is a history of recurrent sore throat, fever and allied toxic symptoms.

The general practitioner has a tendency to lean almost completely on antibiotics, which, no doubt, are of great value. Nevertheless, many of these infections have few external clinical manifestations, and toxemia prevails despite the subclinical course.

The psychiatrist often neglects the organic phase in medicine and concentrates almost exclusively upon the psyche. Many articles have been written about the traumatic shock of the operation, which is said to result in fears, trepidations and anxieties. The lay press has played this up to the hilt and has made a mountain out of a molehill.

Despite the present avalanche of pros and cons, a good history is essential. One may obtain this either from the referring physician or from the parents. When there is a history of repeated attacks of sore throat—three to four times yearly—serious consideration should be given to the question of operation, especially when antibiotics have been administered during each episode. The occurrence of such repeated attacks is positive proof that no immunity has been established by the antibiotics.

Many systemic diseases, such as nephritis and rheumatic fever, have their inception with sore throat. There is no doubt in my mind that the portal of entry in many instances is supplied by the tonsils and adenoids. It is true that many patients have exacerbations of nephritis and rheumatic fever after removal of these structures, but that is probably due to the establishment of secondary foci. The most frequent symptoms are sore throat, recurrent fever and cervical adenitis.

For mechanical reasons, owing to their size, the tonsils and adenoids should be removed in order to improve respiration, deglutition and phonation. Recurrent episodes of peritonsillar abscess associated with cervical adenitis are definite indications for tonsillectomy. In my practice I have noted that a child who has a poor appetite, a pigeon chest, a high-arched palate, or malocclusion; who is puny in appearance and lackadaisical in manner, and who reveals physiognomic changes is definitely a candidate for tonsillectomy and adenoidectomy.

The tonsils and adenoids have many crypts that are ideal places for bacterial growth and multiplication because of moisture, heat, food and aerobic and anaerobic possibilities. In view of these crypts, many forms of toxemia have their inception in the adenoid structures. One finds again and again that the so-called unexplainable temperatures and toxic conditions have their inception in these crypts. They can be readily observed in the tonsil, and can be overlooked in the adenoid tissue. Consequently, it is imperative to seek toxic factors in the adenoids.

Special emphasis should be centered on hypertrophied adenoids. Mouth breathing, interference with respiration, cervical adenitis, transudative and exudative otitis media, acute suppurative otitis media, impairment in hearing, continuous postnasal drainage, malocclusion, snoring, high-arched palate, pigeon breast, pyelitis, and anoxemia are all symptoms. Reflex symptoms are nightmare, night sweat, cough and occasional anuresis. There may also be retarded mental development due to anoxemia.

Many fevers of undetermined origin have had their beginning in the epipharynx. Special attention should be paid to the epipharynx, and by that I mean the adenoids. The adenoids should be removed in order to protect the eustachian tube, because peritubal and tubal lymphatic drainage takes place transtympanically. Should the drainage fluids become loculated in the middle ear, deafness and chronic adhesive processes may result in that area.

Indications far exceed contraindications; nevertheless, in order to make a proper selection, one must evaluate the many contraindications. The treatment of each patient should be individualized. Many forms of sinusitis in children are improved by removal of the adenoids because better aeration is established. It is not advisable to perform tonsillectomy and adenoidectomy during the summer months, because of the prevalence of poliomyelitis—despite the fact that there is no positive evidence of the causal relation between tonsil and adenoid operations and poliomyelitis.

I have just completed a histologic, pathologic, and bacteriologic study of 100 cases, which included treatment of the tonsils, adenoids, tonsil tabs, lingual tonsils and plica triangularis. Only 1 specimen failed to show evidence of gross infection. The remainder showed cellular infiltration, cryptitis, many plasma cells, phagocytes, and many organisms, including beta Streptococcus haemolyticus in rheumatic or arthritic patients. Many specimens showed loculated pus surrounded by mature connective tissue. All plica triangulari revealed lymphoid follicles. The entire study showed evidence of [illegible] infection. It must be borne in mind that a minimum of four weeks was allowed to elapse before operation was performed.

The bacteriologic survey of 103 consecutive cases in which operations were performed by Dr. James Landis of Reading, Pennsylvania, coincides with my observations. The statistics are as follows: 74.2 per cent showed alpha S. haemolyticus Group A, and 10.4 per cent showed other forms. In this group, sensitivity tests of the 103 patients showed that 7.7 per cent reacted to penicillin, 51 per cent to terramycin, 7.7 per cent to aureomycin, 15.3 per cent to acromycin, 61.2 per cent to erythromycin, 45.9 per cent to chloromycetin and 7.7 per cent to streptomycin. The presence of pathologic conditions in the tonsil and adenoid tissue and positive results from tests will help to eliminate public misconception, definitely proving that there are indications for resection.

The modern trend among otorhinolaryngologists is to consider the patient as a whole rather than to visualize him only from the point of view of the tonsils and adenoids. Therefore, thorough inspection, palpation and even complete physical examination do not lie beyond the realm of otorhinolaryngology.

In diagnosis, redness of the anterior pillars is significant of chronic amygdalitis. Compression and eversion should be a routine practice. In this manner, one can express material from the crypts, the contents of which can be cultured and studied bacteriologically and cytologically by means of smears. In the event that one cannot accomplish evacuation of tonsil contents in this fashion, a sterile suction tube may be employed to collect the material from the tonsillar crypts.

Many persons today question the wisdom of removing tonsils and adenoids, owing to the fact that certain unintentional failures may occur. These unfortunate accidents can be attributed to poor technic; recurrent tonsil tabs; neglect of removal of the plica triangularis; damage to the anterior pillar, soft palate and uvula; injury to the posterior pillars; imperfect adenoidectomy and, occasionally, too rigorous adenoidectomy. Promptly (as soon as the tonsil is removed), it should be carefully examined in order to make sure of its complete removal. It is of the utmost importance to explore the superior as well as the inferior pole of the faucial fossa. Weber's gland, which contains mucous glands that are often salivary in structure, is located in the superior pole of the tonsil. If this area is not completely and carefully eradicated, quinsy or peritonsillar abscess may occur. The plica triangularis, which is situated at the lower pole of the tonsil near the base of the tongue, must always be removed, because it contains lymph follicles. If this area is neglected, tonsil tissue will recur. Some surgeons are hesitant to remove the plica triangularis because of the possibility of bleeding, but a "stitch in time" prevents exposure.

In order to do a thorough adenoidectomy, the initial step is to inspect the epipharyngeal fossa by using two Love tongue depressors—one to depress the tongue and the other to elevate the soft palate. This may also be accomplished by means of the Yankauer pharyngeal speculum. Another method is to insert rubber catheters through the nose, one on each side, thus elevating the soft palate. The location of the mass and the size of the epipharynx having been determined, suitable instruments can be selected to fit the epipharynx. Some employ the La Force, the curet, the French adenotone and the Brandegee forceps. The majority of surgeons use curets of various sizes, including a special curet for the fossa of Rosenmueller. Scraping of the epipharynx should be done with gauze wrapped around the third or index finger, because this procedure removes macroscopic vestigial adenoid tissue.

Yet, despite meticulous and conscientious effort, it is frequently necessary to employ the Meltzer, French or Brandegee punches. In these circumstances one must be extremely cautious to remove only the lymphoid tissue and to avoid biting into the mucous membrane or the pharyngeal musculature. At present there are too many primary postnasal packs, made necessary by overmeticulousness and injury with the punches. One of the most serious hazards of adenoidectomy is that one may penetrate too deeply, either with the curet or with the punch, into the palatopharyngeal sphincter, causing damage to the ridge of Passavant. When the ridge of Passavant is disturbed, the patient's voice will invariably acquire a nasal quality; he will be unable to close the nasopharynx completely, and he will often be troubled by regurgitation of fluid through the nasopharynx into the nose.

Another postoperative observation is atrophic pharyngitis due to removal of the adenoid tissue as well as the pharyngeal mucous membrane, resulting in a nonproductive cough and tickling of the throat. In other words, instead of normal moisture in the pharynx, pharyngitis sicca has developed.

One must pay the piper for all of one's actions. Until recently a great deal of radium and roentgen therapy has been used indiscriminately to destroy lymphoid tissue and prevent its recurrence. From the present cry for scrupulously careful adenoidectomy, one must naturally conclude that too much zeal is being exercised in removal of the epipharyngeal lymphoid tissue. To reiterate, in using the punches, only the lymphoid tissue should be removed, as otherwise complications will result.

CONCLUSIONS

The psychic trauma of tonsil and adenoid operations is grossly exaggerated and can be readily obviated by explaining to the child the course of events. Preoperative mental preparation is highly significant.

The surgeon's ultimate aim is to perform a thorough tonsillectomy and adenoidectomy. He must endeavor to prevent damage to any of the structures and to avoid leaving vestigial tissues.

RIASSUNTO

Il trauma psichico legato all'operazione per adenoidi e tonsille può essere evitato spiegando tutto al bambino; questa preparazione psicologica all'intervento può essere molto importante. Lo scopo del chirurgo è quello di togliere completamente le tonsille e le adenoid senza produrre lesioni degli organi vicini e senza lasciare tessuti malati.

RESUMEN

El trauma psíquico de las operaciones sobre amígdalas y adenoides es exagerado y puede evitarse explicando al niño la evolución los eventos. La preparación mental preoperatoria es de gran significación.

El fin último del cirujano es realizar una amigdalectomía y adenoidectomía amplia. Debe prevenir la lesión de cualquier estructura y evitar vestigios tisulares remanentes.

ZUSAMMENFASSUNG

Der mit der chirurgischen Entfernung der Mandeln und adenoiden Wucherungen verbundene seelische Schock wird weit überschätzt und lässt sich leicht vermeiden, indem man dem Kinde den Lauf der Dinge erklärt. Die [illegible] Vorbereit-

ung zur Operation ist von grosser Bedeutung.

Das letzte Ziel des Chirurgen ist die sorgfältige Ausführung der Resektion der Mandeln und adenoiden Wucherungen. Es ist seine Aufgabe, Schädigungen der Gebilde im Operationsgebiet zu verhüten und keinerlei Reste der zu entfernenden Gewebe zurückzulassen.

RÉSUMÉ

Le trauma psychique consécutif au traitement chirurgicale des amygdales et des adénoïdes est surestimé et peut être rapidement prévenu en expliquant à l'enfant le cours des évènements. La préparation mentale préopératoire est très importante.

Le but final est d'effectuer une tonsillectomie complète et adénoidectomie. Le chirurgien doit s'efforcer d'éviter d'endommager quelqu'une des structures et de laisser du tissu vestigial.

SUMARIO

O trauma psíquico acarretado pelo tratamento cirúrgico das amigdalas e adenóides é grandemente exagerado e pode ser prontamente evitado explicando-se a criança o curso dos acontecimentos. Tem grande importância o preparo pré-operatório mental.

O objetivo final consiste em executar-se amigdalectomia e adenoidectomia totais. O cirurgião deve esforçar-se para evitar danos a qualquer uma das estruturas bem como para evitar deixar vestígios dêsses tecidos.

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All phenomena that may be observed by several people are objective. They may be verified and truths formulated in accordance with scientific methods. The subjective fact of pain itself, since it can be observed directly by one person only, is not subject to such direct verification. The fact of pain and the degree of pain, if any, can never be directly determined except on the testimony of the person suffering. . . .

In the study of man's body the difficulties are considerably increased by the fact that little freedom of experimentation is permitted. This is partly overcome in three ways. (1) By studying the resemblances between men and animals and judging what results of experiments upon certain animals are probably also true of man; (2) by observing the effects of accidents and diseases; (3) by studying the physical development of groups of people living under different conditions.

Since scientists have been freely permitted to dissect human bodies and to perform autopsies, and have had the aid of experiments on animals and non-dangerous experiments upon human beings, the science of physiology has made great advances and has come to serve as a reliable guide in matters of health.

—*Kirkpatrick*

Endotracheal Anesthesia for Tonsillectomy and Adenoidectomy in Children: Advantages and Disadvantages

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ENDOTRACHEAL anesthesia is now widely accepted for adults. In fact, it is considered an indispensable part of the preparation of the patient for some operations. Acceptance of endotracheal anesthesia for adults has taken place in spite of the complications reported from its use.

For children also, endotracheal anesthesia is standard for many procedures, such as craniotomy and operations for cleft palate. Its use for tonsillectomy and adenoidectomy in children, however, has gained favor slowly in spite of its being the routine method of general anesthesia for tonsillectomy in adults in many hospitals.

The advantages of endotracheal anesthesia for tonsillectomy and adenoidectomy are as great for children as for adults, if not greater. The disadvantages, in our experience, have been encountered no more frequently and have been of no greater magnitude in children than in adults.

Advantages. — The most important advantage is a consistently adequate airway. This cannot be stressed often enough. In contrast to it is the rather frequent obstruction to respiration that occurs during tonsillectomy when an endotracheal tube is not used. The narrow air passages of the child become obstructed more readily than do the wider passages of the adult. Therefore, precautionary measures to prevent pharyngeal contents from entering the trachea and preparation to insure adequate aspiration of material from the upper and lower portions of the respiratory tract as frequently as seems indicated are more important in children than in adults.

A consistently adequate airway induces quiet respiration and a stable level of anesthesia. With the tube in place, aspiration of foreign material into the trachea is decreased, but an avenue is always open for the removal of such material if aspiration does occur. Furthermore, if artificial respiration is indicated, an effective means is in place.

Keeping foreign material away from the tracheobronchial tree is extremely important. Pulmonary abscess in more than half of the cases encountered at the Massachusetts General Hospital[1] resulted from aspiration of infected material from the respiratory tract. Steele and Anderson[2] reported aspiration of blood from the trachea in 96.9 per cent of 129 patients who underwent bronchoscopy after tonsillectomy under general anesthesia without endotracheal tubes. When endotracheal tubes were used in our patients, bloody secretions rarely were observed in the trachea when the tube was removed at

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.

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the end of the operation. This makes postoperative bronchoscopic procedures rarely necessary.

From the surgeon's point of view, one of the great advantages of endotracheal anesthesia for tonsillectomy and adenoidectomy is the freedom with which the tongue may be retracted to allow exposure without danger of occlusion of the airway. In the cases at the Mayo Clinic the tube was passed through the mouth. It seems unreasonable if one has not tried it, but actually the field of operation is improved by the tube, because freedom of retraction of the tongue is allowed. When the surgeon is removing the left tonsil, the tube is held in the right corner by the sucker tip and descends along the right border of the tongue, well away from the site of the operation. When the right tonsil is being removed, the anesthetist or the surgeon can move the end of the endotracheal tube to the left corner of the mouth, and the sucker tip can be used to move the tube to the left border of the tongue. At the Mayo Clinic we prefer to have the patient lying on his back; the same method, however, could be used quite as easily if the Rose position is preferred.

When it comes to adenoidectomy the advantages of endotracheal anesthesia are apparent. The operation does not have to be hurried, and ample time is available for direct inspection of the nasopharynx and thorough cleaning with a Meltzer biting forceps. A few otologic and rhinolaryngologic surgeons use the tube through the nose instead of through the mouth, claiming that it does not prevent them from doing a thorough adenoidectomy. We have had little experience with this technic, but there seems to be no serious objection to it, especially when it is used for an older child who has a large roomy nasopharynx in which the tube can be easily pushed from side to side.

Disadvantages. — We have little to say about the disadvantages, for, although endotracheal anesthesia has not been as readily accepted for children as for adults, it is gaining a better foothold daily. Use of the procedure for children has been most favorably reported by Slater and Stephen[3] and has been advised against by Baron and Kohlmoos.[4] In many communities there have been two camps, one enthusiastically in favor of endotracheal anesthesia for children and one violently against it. Otolaryngologists have voiced the biggest objection; the resistance, however, has been much less in the past few years, the reason being that the anesthetist and, especially, his tools are better.

From 1946 to 1951 inclusive, 1,050 endotracheal intubations were performed at this clinic for tonsillectomy or adenoidectomy, or both, on patients less than 15 years of age. Part of this study has been reported elsewhere.[5] No serious complications were encountered. Probably minor complications often were overlooked because of the nature of the operation. Twice the endotracheal tube was displaced. This is a definite inconvenience and hazard to the patient, because of the delay and the need of reinserting the tube.

In our opinion, then, the only real disadvantage of this type of anesthesia is the fact that the services of a trained anesthetist are required. If attention is not given to certain details that aid in the prevention of complications, the complications may be considered disadvantages. These, however, are the result of faulty technic and are not inherent disadvantages of endotracheal intubation. If a qualified anesthetist is not available, the otolaryngologist can easily acquire the simple technic of introducing the tube himself. It is highly preferable, however, to have a trained anesthetist introduce it.

Factors Important for Prevention of Complications. — The following general rules are those that were successfully followed to avoid complications of intubation in young patients at the Mayo Clinic:

Trauma During Intubation: Since the mucous membranes of children are less resistant to injury than are those of adults, more gentleness is required during exposure of the larynx and insertion of the endotracheal tube. The anesthetists, therefore, have insisted on the induction of moderately deep anesthesia before intubation, so that at the time of intubation the child's mouth can be easily opened and the laryngeal reflexes are abolished. Once the tube is in place, light anesthesia is all that is needed; that is, just enough to keep the patient from swallowing or coughing. Frequently it has been found feasible to discontinue the administration of ether after intubation and to complete the operation with the administration of nitrous oxide and an adequate concentration of oxygen.

Physical Characteristics of the Endotracheal Tube: The frequent use of intubation for children was not justified until thin-walled, kink-resistant tubes like the King and Magill tubes became available. The lumen of the endotracheal tube must be large enough to allow flow of the respiratory gases to and from the patient without undue resistance. The practice of making tubes for children out of thick-walled urethral catheters or stock rubber tubing is to be condemned. The tip of the tube should extend far enough into the trachea to insure that it will not be dislodged during the operation, but not far enough to enter a bronchus or impinge on the coryna.

As large a tube as can be passed easily through the larynx should be used. Before intubation several sizes should be prepared, so that, if the first tube selected is too small or too large, one of proper size can be chosen quickly.

Duration of Intubation: When the duration of anesthesia is fairly short, as for tonsillectomy and adenoidectomy in most cases, the time factor does not seem important. One of us (J. W. P.[6]) recently studied endotracheal anesthesia in all types of surgical procedures; he noted that complications were most frequent (5.4 per cent) after neurosurgical operations on the head and neck, for which the mean duration of intubation was longest (one hundred and thirty-eight minutes), and they were least frequent (0.3 per cent) after tonsillectomy and adenoidectomy, for which the mean duration of intubation was shortest (forty-one minutes).

Motion of Tube in Larynx: Even when the tube is lubricated, trauma is increased by movement of the tube against the larynx and trachea. The tube, therefore, should be moved as gently and infrequently as possible. Since coughing and swallowing increase trauma, the endotracheal tube should be removed as soon as possible after the laryngeal reflexes become active in the postanesthesia period.

As soon as the operation is completed, the patient should be turned to the prone position, with the tube in place to allow pharyngeal secretions to drain out by gravity. The tube should be removed as soon as the patient begins to gag or swallow.

Infection and Chemical Irritation.—One of us (J. W. P.[6]) and many others have always stressed the fact that only chemically and bacteriologically clean tubes should be used. For further protection, all patients at the clinic have been given penicillin before and after operation. It is difficult and sometimes impossible to prove that these factors exert an influence on the incidence of complications after endotracheal anesthesia for tonsillectomy and adenoidectomy in children. Only by ul attention to all of the aforementi tors, however, can the frequency plications be minimiz

COMMENT

In the authors' opinion, the danger of cardiac arrest is markedly decreased when endotracheal anesthesia is used, because an adequate airway and adequate oxygenation are present all the time. The intermittent bouts of anoxia so commonly seen before the threatened cardiac arrest are avoided. Indeed, one might go so far as to say that even a poorly executed endotracheal anesthesia is safer for preservation of life than is the use of open mask with its hazards to the airway so vital for prevention of cardiac arrest. Every ear, nose and throat surgeon who performs tonsillectomy and adenoidectomy on children has some basic requirements for the anesthesia: (1) adequate exposure for the work to be done, and (2) good anesthesia with freedom from worry (that anything untoward may happen to the patient). Endotracheal anesthesia, in the authors' opinion, meets these requirements.

ZUSAMMENFASSUNG

Nach Ansicht der Verfasser verringert sich die Gefahr des Eintretens eines Herzstillstands erheblich bei Anwendung endotrachealer Narkose, weil dadurch eine ständige ausreichende Luft- und Sauerstoffzufuhr gewährleistet wird. Die intermittierenden Erstickungsanfälle, die so häufig als Vorläufer eines drohenden Herzstillstands auftreten, werden vermieden. Man kann sogar sagen, dass selbst eine nicht sehr fachmännisch ausgeführte endotracheale Narkose noch immer ein grösserer Sicherheitsfaktor zur Erhaltung des Lebens ist als die Anwendung der offenen Maske, die so grosse Gewahren für das Offenbleiben der zur Vermeidung eines Herzstillstands unentbehrlichen Luftwege in sich trägt. Was jeder Hals- Nasen- Ohrenarzt, der Entfernung der Rachenmandeln unde der adenoiden Wucherungen an Kindern vornimmt, grundsätzlich von der Narkose erwartet, ist erstens die Möglichkeit ausreichender Exposition des Arbeitsfeldes und zweitens eine gute Schmerzbetäubung ohne die Sorge, dass irgendwelche den Patienten schädigende Zwischenfälle eintreten könnten. Die Verfasser glauben, dass die endotracheale Narkose diesen Anforderungen gerecht wird.

RÉSUMÉ

Les auteurs pensent que l'intubation endotrachéale diminue grandement le danger de l'arrêt cardiaque en assurant une respiration et une oxygénation adéquates constantes. Elle évite les poussées d'anoxie si souvent constatées avant l'arrêt cardiaque menaçant. Une intubation endotrachéale même mal exécutée est préférable, pour préserver la vie du patient, que l'utilisation du masque. Tout spécialiste oto-rhino-laryngologue que pratique l'ablation des amygdales et des végétations chez les enfants connaît les principes de base de l'anesthésie: 1. Préparation opératoire adéquate; 2. Bonne anesthésie, sans aucun souci secondaire des suites opératoires.—L'intubation endotrachéale répond à ces conditions.

SUMARIO

Na opinião dos autores o perigo da parada cardíaca fica consideràvelmente diminuido quando é usada anestesia endotraqueal, porque mantem-se sempre via aérea e oxigenação adequadas. São evitados os surtos intermitentes de anoxia, vistos tão comumente antes da parada cardíaca pendente. Na verdade, pode-se mesmo dizer que uma anestesia endotraqueal mal executada é mais segura para a preservação da vida do que o uso da máscara aberta, com seus perigos em relação à via aérea, tão vital para a prevenção da parada cardíaca.

RIASSUNTO

Secondo gli Autori il pericolo dell'arresto cardiaco viene diminuito di molto dall'anestesia endotracheale in quanto questa assicura, per tutto il tempo dell'intervento, un'ossigenazione ed una pervietà delle vie respiratorie del tutto adeguate. Vengono quindi evitati quegli episodi di anossia che comunemente intervengono prima che si instauri l'arresto cardiaco. Pertanto si può arrivare a dire che l'anestesia endotracheale, anche condotta poco bene, è più sicura dell'anestesia con maschera aperta dato che quest'ultima non assicura la pervietà delle vie aeree, così importante nella prevenzione dell'arresto cardiaco. Ogni otorino-laringo-jatra che operi tonsille o adenoidi nell'infanzia pretende dall'anestesia alcuni requisiti fondamentali: 1) adeguata esposizione del campo su cui deve operare; 2) e un buon grado di anestesia che eviti agitazione da parte del paziente. Requisiti che, secondo gli Autori, ha appunto l'anestesia endotracheale.

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Just as the soil that has lain fallow produces a richer harvest, so it is with human beings—the bare and silent moments are those when the busy mind finds light and air. The thoughts that arise in these brief intervals, when one takes time to look up, are growing thoughts.

—*Karasz*

To live in the presence of great truths and eternal laws, to be led by permanent ideals—that is what keeps a man patient when the world ignores him, and calm and unspoiled when the world praises him.

—*Balzac*

Editorial

Anniversary in Geneva

IN 1935, just twenty years ago, the archives of surgical history were opened to record a new step forward in the deliberate evolutionary process we call civilization. We can imagine Time, that weary but august historian, drawing a sigh of pleasure and relief as he dipped his quill; we can even imagine him muttering "At last! after what centuries . . ."

But all Time's servants did not share his pleasure. They never do. At that time the active concept of a unified world had been born, had undergone a few feeble convulsions and had apparently died, despite all efforts to save it. This was regarded by many as proof in advance that the new venture also would perish. In the first place, it was new, and therefore dangerous; in the second place, it was hedged about with so many difficulties, personal, national, racial and religious, that only a miracle could carry it beyond the door of its birth chamber, and in the third place—ah, that old refrain!—it was "against human nature."

How right they were! It was dangerous indeed—to prejudice, international hostility and the hoarding of knowledge that rightly belongs to the world. And of course it was "against human nature"; so is cleanliness. As for the miracle, it had already happened, and nothing unheard of, either, for miracles happen so often that nine out of ten pass unnoticed. Whenever and wherever the mind of man lays hold upon an idea so powerful that it can stir the imagination and enlist the allegiance of men all over the world, *a miracle has happened*—one need not wait longer for it.

We of the International College of Surgeons are excusably proud of preserving our miracle alive. We know too well how many splendid and world-changing concepts have appeared, gleaming, and then dropped suddenly back into the abysm because of man's eternal arch-enemy, fear; fear of public opinion and public ridicule; fear of being different, of seeming "unrealistic"; fear of acquiring a crackpot's reputation should one express one's faith in the potential greatness of the human mind and spirit. The best of us is not entirely free from qualms of this kind, but those to whom history will be kindest, we believe, are those who recognize them as the spawn of vanity and treat them with the determined scorn they deserve. Nor will they have to wait for history's verdict. Any man alone or in any company of men, large or small, who achieves this stern denial of "human nature" knows instantly that he has increased his stature, and there is no more nonsense about appearances. Who looks at appearances after catching a glimpse of Truth?

Men of science ought to be, and often are, among the best equipped for this enlargement. Perhaps this accounts for the fact that the International College of Surgeons, an organization based on the universality of science, the irrelevance of national differences and the essential fraternity of all scientific workers, has become a solid and permanent world entity while the concept of a unified world, based on much the same foundation with regard to mankind in general, is still struggling for its existence. The trained scientist is accustomed to sudden reversals and changes, to the loss of years of patient and painstaking toil and to the acceptance of ideas and principles not his own. He cannot be otherwise and remain a scientist.

However that may be, the College has survived. It was a promising infant, and it is now full grown. It stands today as an irrefragable proof of man's essential worth and dignity at their best. It is a deep satisfaction to know that we have achieved this without once descending to "fight fire with fire"; we have little faith in the hair of the dog that bit us as a therapeutic adjunct, and we have so conducted ourselves and our organization that no justifiable attack could be made upon us. Such flurries as we have encountered we could ignore, and well afford to. A record of twenty years' unaltered devotion to an unchanged and unchangeable ideal is proof enough of the strength of our foundations, and the fact that the architects of our structure have come from all over the world, from the very day the ground was broken, and have remained, like the cathedral builders of old, to lay stone after stone with an artist's dedication, is more than enough to give the lie to those who say that man cannot rise above himself.

This year, in Geneva, where the College was founded, we shall celebrate its twentieth birthday. There will be rejoicing and congratulations, and with good reason. But there will also be, as there is at every meeting of the College, a sense of dedication renewed, a reexamination of values and a great deal of that humility which, in moments of triumph and success, is able to remember that the best is yet to come. As the race of man advances in its painful and difficult march, new problems and difficulties will arise, and we must be ready to meet them. —M. T.

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Correction: A letter from **Dr. James F. Brailsford**, F.R.C.S. (Eng.), F.I.C.S., of Birmingham, England, author of the two editorials on Semmelweis first published in the *Birmingham Post* and reprinted in the October 1954 issue of this *Journal*, reads as follows: "It has been brought to my notice that there is a further memorial to Semmelweis in Vienna at the Staedtische Frauenklinik Semmelweis, where **Prof. Dr. Hans Heidler** is in charge. I much regret that I was not directed to this Institute when I made my inquiries at the University and the Allegemeine Krankenhaus in Vienna, as I should have liked to see it and photograph it for my lecture. I trust this explanation will assure Prof. Heidler that my omission was solely due to failure to elicit information from sources which ought to have been able to supply it."

New Books

Books Received.—The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

Legal Medicine, Pathology and Toxicology. By Thomas A. Gonzales, Morgan Vance, Milton Helpern, and Charles J. Umberger. 2nd ed. New York, Appleton-Century-Crofts, Inc., 1954. Pp. 1349. Profusely illustrated.

Les Vomissements du Nourisson: Etude critique, Diagnostic étiologique, Indications thérapeutiques. Par Emilio Roviralta. Edition revue et augmentée par l'auteur en 1952. Adaptation française de Bernard Duhamel, d'après la traduction de Edouard Del Castillo Japuolot. Paris, Éditions Médicales Flammarion, 1952. Pp. 236. Illus.

Technique de la Chirurgie du Sympathique et de ses Infiltrations. Par O. Lambret, P. Razemon, et P. Decoulx. 4e éd. Paris, G. Doin & Cie., 1953. 115 figures et 4 planches.

Cystites Invétérées et Algies Pelviennes, leur Traitement par Infiltrations Anesthésiques et Neurotomies Chirurgicales. Par Raymond Darget et Rolland Ballanger. Paris, Masson & Cie., 1954. Pp. 118. Illus.

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The Liver and Cancer. By Kasper Blond *Bristol: John Wright & Sons, Ltd., 1954.*

This book does not just advance a new cancer theory. It is a careful record of the researches during the past thirty years of a man with considerable critical ability and clinical knowledge of his subject. He rightly insists that the origin of cancer is a problem of life; therefore, more can be learned from human physiology as a whole than from cellular preparations. He realizes that his views are opposed to those on which orthodox methods are based, but, as he says, "progress in science and medicine does not derive from the many who accept established ideas but from the few who dissent." This is clearly borne out by a study of most of the many real advances in medicine. It can therefore be assumed that the work will be considered a revolt against the orthodox methods of cancer research and treatment. But does not the poverty of success of the latter surely call for such revolt, certainly for thought?

Dr. Blond has examined the publications of the best known researchers on cancer and the cancer statistics of the world's leading countries. He has carefully and critically compared the frequency of the disease in different sites and the conditions that appear to determine those sites. He shows that, though the distribution of cancer sites development differ in male and female, the number of total deaths from cancer in both sexes is almost identical, even though it is claimed that, of cancers in some sites, 40 per cent are cured. The statistics show that cancer in adults originates in the gastrointestinal tract in 80 per cent of cases, but he brings evidence to indicate that 90 per cent of cancers in children are due to metabolic toxins derived from the mother via the placenta. He offers his explanations for these data. He points out that, whereas the so-called cancers of the skin are so infrequently associated with secondary metastases that to them have been attributed a protective immunizing property, cancer of internal organs are commonly associated with secondary tumors. He goes further and indicates what many have good reason to believe, that cancer in any site is a localized expression of a generalized condition, but instead of accepting the prevailing opinion that certain substances acting locally are cancer-producing he brings forward strong evidence that the local damaging effect of these substances merely determines the site of local expression, since the damage they do is essentially to the liver, further, that the cancer, instead of producing protective antibodies, lives on the metabolic poisons that have escaped the detoxicating effects of the liver, the central organ of metabolism—escape from the liver being facilitated by the absence of valves in the portal vein, by shunts between the portal vein and the venous system, and by portal hypertension with reversion of the portal blood due to damage to the liver. These metabolic poisons are essential for the growth of the cancer, and until they are present in sufficient abundance only the primary cancer can be supported. When the damage to liver function is so severe that portal hypertension exists, a greater proportion of metabolic poisons escape detoxication by the liver and metastases can develop; but until then the primary cancer tends to use up the toxins necessary for its growth and metastases have no available food for development. For cancer does not produce toxins, it thrives on them.

With removal of the primary cancer by surgical means, the metabolic poisons become available for the development of metastases, and they develop as rapidly as the supply of toxins permits, depending on the degree of efficiency of the liver in detoxicating these metabolic toxins—the more severe the liver damage, the more metabolic toxins are available and the more rapid the development of metatases. Hence, in some cases, the primary cancer may persist and develop for ten or more years without any sign of metastases, whereas in others prompt removal of a primary cancer may be followed almost immediately by the development of extensive metastases—"numerous as mushrooms after summer rain," as Blond puts it—the delay in development being determined by the efficiency of the liver in detoxicating metabolic poisons and in the quantitative activity of agents capable of doing localized damage.

All the so-called cancer-producing substances, such as coal tar derivatives (aniline dyes for coloring or preserving foods, paraffins, medical preparatives, etc.), parasitic exudatives and secretives, tobacco, excess alcohol, roentgen rays or other irradiations, diseases of the liver (syphilis, etc.), act by damaging the liver. If given in sufficient quantities experimentally they may kill the patient before cancer appears. They act in a quantitative manner; the more absorbed, the greater the damage to the liver and the greater the facility for cancer development. As a result of these agents the damaged liver permits the escape of metabolic poisons from detoxication. It is these and these alone which can supply the necessary food for the development of cancer.

The prevention of cancer, therefore, calls for limiting the intake of substances or the contracting of diseases liable to damage the liver. Early detection is important, since it indicates the need to concentrate on the care of the liver and the elemination of metabolic poisons. Such treatment will permit resolution before serious anatomic and physiologic damage has been done. At worst, such treatment can offer only a general improvement in health. Surgical removal of the primary tumor merely shifts the site of cancer development. Experience proves that it may actually facilitate the spread and development of cancer deposits; it cannot cure, since the cause, the damage to the liver, is neglected and continues to act.

The book cannot be assessed by a superficial reading. It demands careful consideration, free from bias as to the facts presented. Dr. Blond's frequent repetition of his theory in criticism of the publications of leading cancerologists, though to the unwilling recipient they may be unnecessarily annoying, serve to emphasize the need of respect for this unorthodox theory. He leads us back to the teaching of Hippocrates that "in cases of hidden cancer it is best to give no treatment: treatment causes early death, but to refrain from treatment is to prolong life." Except in those cases in which the cancer is producing a physical obstruction, experience shows that this advice is still true.

JAMES F. BRAILSFORD, M.D.

La Resezione Epatica Atipica e l'Epatectomia Tipica. By Rino Rossi. Supplement to **Patologia Sperimentale e Chirurgia** (Milan), Vol. 1, 1953. Pp. 89. 29 illustrations, 4 in color.

This monograph reviews the present status of hepatic resection and lists certain principles for its application and advancement, both on the experimental and on the clinical level. From a technical point of view, the author emphasizes the distinction between "typical" and "atypical" operations. The former are characterized by a systemic identification and preparation of the elements to be excised, including especially the ligature and resection of the portal branch to the area. This in turn facilitates exact identification of the area to be eliminated, as well as its arterial and biliary branches. Typical resections include right and left lobectomy and segmental resection; the author identifies seven hepatic segments in men—four on the right and three on the left.

He points out that the typical procedure, as first performed by Pettinari (1940), is the method of choice but may be contraindicated by anatomic and pathologic conditions. Thus, the vast majority of resections reported in the literature have been atypical.

The several variations of the typical technic in man are presented in some detail. Experimental technic in the dog is also presented in detail as practiced by the author.

The monograph further includes a review of the indications and results of liver resection, with emphasis on precautions necessary in cases of malignant neoplasm. Noting the postoperative death rate of 4 to 6 per cent in the 670 recorded cases, the author points out that a number of conditions formerly treated by cystectomy, cyst marsupialization, etc., would be more correctly managed by parenchymal resection, which is less dangerous.

The details of the experimental development of typical resection make this work especially valuable.

The first volume of **Patologia Sperimentale e Chirurgia** appeared in 1953, under the general editorship of Vittorio Pettinari and under the aegis of the Instituto per la Diffusione de Opere Scientifiche in Milan. Perusal of its contents affirms its high promise as a forum for experimental surgery and for clinical surgery with experimental implications. Polyglot summaries add to its international usefulness.

MAX THOREK, M.D.

Patho-Physiologie Der Atmung in Der Lungenchirurgie By J. Maurath, Stuttgart; Georg Thieme, Verlag, 1955. Pp. 80, with 31 illustrations.

"The Patho-Physiology of the respiration in surgery of the lungs" is a booklet that represents the results of studies the author has undertaken over a number of years. The book is divided into a brief historical introduction, a chapter discussing technics of different types of examination, a chapter on experimental results, a chapter correlating the results of different examinations with the clinical picture, and a summary.

The author considers six tests essential for thorough knowledge of pulmonary physiology. 1. Spirography (Knipping) 2. Gas analysis of arterial blood. 3. Rossier's epinephrine Test. 4. Calculation of the alveolar function. 5. Bronchospirometry. 6. Tiffeneau's test.

Technical details are thoroughly discussed. An intelligent correlation between diseases of the lung, surgical procedures and functional observations given. The discussion of different features shows that the author not only is theoretically well trained but speaks from an excellent practical experience.

The book is recommended for the library of the thoracic surgeon as well as for anybody who is interested in the generally rather neglected field of respiratory physiology.

WERNER F. EISENSTAEDT, M.D.

Atlas of Operative Technic: Anus, Rectum, and Colon. By Harry E. Bacon and Stuart T. Ross. St. Louis: The C. V. Mosby Company, 1954. Pp. 301, with 403 illustrations.

Anyone interested in surgical treatment of the colon, rectum and anal canal will find profitable reading in this outstanding atlas. The illustrations, which present clearly and succinctly the consecutive steps of various operative procedures, are accompanied with pithy step-by-step descriptions. There is no redundancy in this book, since obsolete operative procedures are omitted completely. The authors, who are seasoned surgeons, have emphasized the importance of complicated and complex fistulas. Their admonition that these conditions may be "more tedious and more difficult of proper execution than some colonic resections" warrents reemphasis.

Studying this notable book, one cannot help but be impressed with the close collaboration that must have existed between the authors and the artists. Melford de Diedrick, Leon Schlossberg, and William B. McNett are to be congratulated for having produced such clear-cut and beautiful illustrations. The tridimensional aspect of their work is particularly noteworthy. To Drs. Bacon and Ross go this reviewer's felicitations for having brought forth this illustrious atlas of operative technic. It will remain a classic contribution to contemporary surgical literature and practice.

The book can be recommended unreservedly.

PHILIP THOREK, M.D.

New Illustrated Practice of Surgery; Part VIII. Jean Quenu, Editor. Paris: G. Doin et Cie. Pp. 264. 1954.

This is the eighth of a series of brochures describing major operations as currently practiced by surgical specialists in France. The value of these little works is greatly enhanced by the use of faithful line drawings by S. Dupret, the noted French medical artist. The group of eight fascicules covers practically the entire field of surgery. Actual cases illustrative of technics employable in an active clinic have been selected for description and depiction. No order or sequence has been observed in the grouping of the examples, nor are they confined to any particular field of surgery. The contents of Fascicule VIII, which contains 225 illustrations, may be summarized as follows:

1. Subpallidal extrapyramidotomy by electrocoagulation (F. Fenelon).
2. Left pneumonectomy for bronchogenic carcinoma (G. Thomeret).
3. Surgical cure of a hiatus hernia by transthoracic approach. Allison's Technique (J. Perrotin).
4. Extramucous esophagocardiotomy for mega-esophagus by the transthoracic approach (J. Perrotin).
5. Subtotal colectomy (J. Quenu).
6. Le Fort's operation for complete genital prolapse (J. Quenu).
7. Radical castration with extirpation of the lumbar lymph-nodes (J. Quenu).
8. Operative cure of coccygeal fistula (C. Longy).

The individual operations are described in minute detail, and the schematic drawings cover each step. Nothing is left to the imagination, which is praiseworthy, since it gives the work the greatest usefulness to the resident and the young surgeon, while for the older surgeon it outlines alternative technics with unmistakable fidelity. It is worthy of mention that none of the procedures discussed are stereotypes and that one or more original points in technic are presented by each author. Practical remarks on etiologic factors, diagnosis and indications for surgical intervention accompany each report.

This reviewer found the description of subtotal colectomy and radical castration with lumbar lymphadenectomy particularly interesting.

The entire collection is to be recommended.

ULYSSES GRANT DAILEY, M.D.

Die Cytologie des Bronchialskretes. By Dr. Med. P. Hartmann. Stuttgart; Georg Thieme, Verlag, 1955. Pp. 110, with 28 illustrations.

The "cytology of the bronchial secretions," as discussed by the author, represents a conscientious study of a rather difficult subject. The author gives a brief historical review of the subject. This chapter is followed by a chapter on the normal cytology of the bronchial secretions. An interesting chapter is the one describing autolytic changes of the normal epithelium, a rather frequent observation, but unfortunately seldom discussed.

A thorough discussion, with representative pictures of smears and sections, brings out the essential diagnostic features of tumor cells. The final chapters discuss methods of obtaining specimens, fixation and staining procedures, and diagnostic criteria for cytologic observations.

The book is clearly written. In the opinion of this reviewer, it would be a great improvement if the pictures of tumor cells and normal epithelial cells were not be in black and white but in color. The student of cytology will have to make his diagnosis from colored slides, and black and white pictures are sometimes rather confusing compared to the actual appearance of smears.

All in all, the book is highly recommended for medical students and residents. It is a valuable summary of the present knowledge of cytology of the bronchial secretions.

WERNER F. EISENSTAEDT, M.D.

Cystites Invétérées et Algies Pelviennes, leur Traitement par Infiltrations Anesthésiques et Neurotomies Chirurgicales. By Raymond Darget and Rolland Ballanger. Paris, Masson, 1954. Pp. 118. Illustrated.

Many years' experience in dealing with the grave disability and agony of refractory cystitis and pelvic algia have led to the rationale of treatment presented in this brief but weighty monograph.

The authors' primary attack is by infiltration or surgical section of the erector nerves, to which may be added a similar procedure on the pudendal nerves. They consider that section of the hypogastric or presacral nerve should be accessory, and may even prove useless.

To relieve painful micturition, pollakiuria or detrusor spasm, they consider it is essential to interrupt the erector nerves. When pain extends to other pelvic areas, operation on the pudendal nerves may be essential. In some cases both procedures are necessary.

The success of these methods with conditions that might have been deemed inoperable leads the authors to the firm conviction that neurotomy as here described must now be given a serious trial before more complicated plastic operations or ureterostomies are considered.

The philosophy of this treatment is presented in a fashion that is expert and to the point. After discussing the entities and their complications, the authors describe the innervation and physiologic aspects of the bladder, posterior ureter and false pelvis. Their own therapeutic methods are then presented in detail, followed by reports of their results. A final chapter discusses the indications for various methods of treatment.

The operative approaches and technics are described in full detail, with the aid of photographs, diagrams and cystographs.

This little book should command the interest of urologists, general surgeons and gynecologists, as well as general practitioners, who may well profit from the simpler methods.

MAX THOREK, M.D.

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Happiness? That's nothing more than good health and a poor memory.

—*Shweitzer*

Abstracts from Current Literature

A Comparison of Vagotomy and Gastric Resection for Gastrojejunal Ulceration; A Follow-Up Study of 301 Cases. *Walters,* W., Chance, D. P., and Berkson, J., Surg., Gynec. & Obst. 100:1, 1955.

Before the advent of vagotomy the treatment of gastrojejunal ulcer was fairly well standardized. Excision of the ulcer with high gastric resection was the procedure of choice. When gastrojejunal ulcer developed after partial gastric resection the outlook was not too satisfactory, for re-resection was attended by an operative mortality rate of about 10 per cent, and only about 50 per cent of patients so treated obtained satisfactory results. By contrast the outlook of the patient with gastrojejunal ulcer after gastroenterostomy was favorable, because excision of the ulcer and high gastric resection gave excellent results in 85 to 90 per cent of the cases, with an average operative mortality rate of 4.1 per cent.

With the advent of vagotomy the results of treatment of gastrojejunal ulcer developing after gastric resection have been improved. Because of this, some surgeons are now advocating vagotomy as the treatment of choice for all gastrojejunal ulcers, including those which follow gastroenterostomy. This study was undertaken to compare the effectiveness of vagotomy with that of gastric resection in the management of gastrojejunal ulcer after gastroenterostomy and the effectiveness of vagotomy with and without gastric resection with that of gastric re-resection alone, in the management of gastrojejunal ulcer after gastric resection.

This study is important because it shows the superiority of gastric resection over vagotomy in this respect, at the same time demonstrating the important role of vagotomy in the management of gastrojejunal ulcer after a partial gastric resection.

The complications of gastrojejunal ulcer are perforation, gastrojejunocolic fistula and hemorrhage.

Treatment of gastrojejunal ulcer resolves itself into vagotomy, alone or combined with other procedures, and adequate gastric resection, with removal of approximately two-thirds of the stomach. There are definite indications for both procedures.

Vagotomy is generally accepted as the treatment of choice for gastrojejunal ulcer *following resection of at least two-thirds of* the stomach. The present study indicates that vagotomy can be expected to give excellent results in 70 per cent of such cases and carries a low operative risk.

In over 70 per cent of patients in whom the gastrojejunal ulcer develops after an inadequate resection of a third to half of the stomach, vagotomy can be expected to give excellent results, with a low operative mortality; if re-resection is deemed advisable by the surgeon, however, vagotomy may be added without greatly increasing the operative risk and may give the patient additional protection against further ulceration.

W. E. North, M.D.

Treatment of Arteriosclerosis and Vague Abdominal Distress with Niacinamide Hydroiodide (Without Side-Effects). Feinblatt, T. M.; Feinblatt, H. M., and Ferguson, E. A., Am. J. Digest. Dis. 22, 1955. (Author's abstract.)

The therapeutic value of niacinamide hydroiodide combined with sodium iodide in cases of generalized arteriosclerosis without hypertension was studied in a series of 59 cases. There were 33 female and 26 male patients. The average age was 61; weight, 149 pounds; blood pressure, systolic 149, and diastolic 87 mm. of mercury. The symptoms were dizziness in 55 cases, excessive fatigue in 51, vague abdominal distress in 45, chronic headaches in 33 and disorientation in 24. Aortic sclerosis was present in 36 cases and arcus senilis in 26. Intravenous iodo-niacin injections (5 cc. containing 100 mg. of niacinamide hydroiodide and 1 Gm. of sodium iodide) followed by iodo-niacin tablets (niacinamide hydroiodide 25 mg. and sodium iodide 135 mg.) were administered for more than a year. Dizziness was relieved in 71 per cent of cases, vague abdominal distress in 87 per cent, chronic headaches in 61 per cent and disorie [illegible] cent. There was no symptom [illegible] ide [illegible] t in any case, ev [illegible] given. The comp [illegible] attributed to the use of niacinamide hydroiodide. It is the authors' opinion that antipellagric action of this drug corrects dysfunction of the co-enzyme oxidation system by a mechanism similar to that of niacinamide hydrobromide in relation to bromism.

T. M. FEINBLATT, M.D.

Maximum Urine Concentration. Miles, B. E.: Paton, A., and Wardener, H. E., Brit. M. J., 1954, 2:901, 1954.

One of the most easily studied functions of the kidney is its capacity for the conservation of water under conditions of dehydration. In these circumstances water is reabsorbed from the tubular fluid against an osmotic gradient through the influence of endogenous antidiuretic hormones, and the maximum concentration of the solutes is used as an indication of the kidney's ability to perform osmotic functions.

This capacity for osmosis is the property that determines the extent to which the solutes can be concentrated, but specific gravity is usually measured for clinical convenience, although it gives only an approximate indication of the osmotic function.

Specimens of normal urine were examined by the authors for the purpose of correlating specific gravity with osmolarity. It was observed that considerable variations of the former may occur in specimens in which the latter is quite similar. Unexpected fluctuations in the osmolarity of urine occur during progressive dehydration.

EDMUND LISSACK, M.D.

Dicumarol Sensibility as a Test of Liver Function. Hulten, O.: Acta Soc. Medicorum Upsaliensis 59:356, 1954.

It is well known that dicumarol and tromexan lower the prothrombin value of the blood by an action on the hepatic substance. Their effect depends largely on the state of liver substance. The test gives constant results in a given subject, but there is a considerable variation among different subjects.

The experience of dicumarol tests is based on more than 350 cases, in many of which the patients have been examined repeatedly. The impression is gained that this test has considerable clinical value as a test of liver function, especially in connection with surgery, as it is concerned with a particular function of the liver which is of interest to a surgeon. When a latent deficiency in prothrombin formation has been revealed by means of this test, vitamin K should be administered before and after an operation. Because of unknown factors in the absorption and metabolism of dicumarol, there are present such sources of error in the test that only pathologic values can be used; normal values do not exclude liver damage. Nevertheless, the dicumarol test promises to be of such value in clinical practice that continued research in this field is particularly desirable, and it is hoped that the method will thereby be further improved.

W. E. NORTH, M.D.

The Breast Nodule. Analysis of Three Hundred Thirty-Six Consecutive Biopsies of Breast. Eloise Parsons, E., and Helen Pisarek, H., J.A.M.W.A., 1954, 9:317, 1954.

Cancer of the breast is a challenge to modern physicians. An increasing number of women are presenting themselves for examination. Physicians must consequently examine each one thoroughly.

In the series studied by the authors, 76 cancers, an incidence of 22.6 per cent, were discovered in 8,114 surgical patients. Seventy-eight mastectomies were performed, 50 of them radical. In 20 cases there were suggestive changes which did not prove to be malignant. In 18 cases carcinoma was coexistent with benign lesions, which suggests the potentiality of benign lesions to become malignant. There were 14 girls under the age of 20 who had lesions of the breast: in 1 the authors observed proliferation suggestive of early malignant disease.

Physicians are urged to accept their unusual opportunity to reduce the mortality rate of cancer of the breast by education of their patients and by early, thorough diagnosis and treatment. It is advised that family physicians teach their patients to examine themselves, to report anything suggestive, and to seek examination at regular intervals. In the authors' opinion, this does not make women fearful. On the contrary, it increases their faith in the physician, which will be extremely valuable in case malignant disease does develop.

EDMUND LISSACK, M.D.

Vaginal Delivery Following Cesarean Section. Nel, J. B., South African M. J. 28: 533, 1954.

The author states that the importance of vaginal delivery after cesarean section has been appreciated by obstetricians since the time women first survived abdominal delivery.

Cesarean section was performed on the dead even before the birth of Christ and on the living as early as 400 A.D., according to the Talmud. Tarnier of Paris and Spaeth of Vienna remarked that in 1877 it had not yet been successfully performed in either of these two leading centers of obstetrics. In 1886 Krukenberg reported 120 cases of rupture of the scar and stated that the uterus ruptured in 50 per cent of all pregnancies after this operation.

In 1824 the extraperitoneal approach to the lower segment was discussed by Physick and Dewees but not practiced by either. Porro of Pavia performed a successful cesarean hysterectomy in 1876, and the operation was repeated in Vienna the following year, with a satisfactory result for the mother.

Between 1890 and 1900 the maternal mortality rate of this procedure at a few clinics was reduced to 5 per cent.

In America, Beck, Hirst and De Lee popularized the lower segment operation. The author states that many authorities, if not the majority, maintain that the dictum "Once a cesarean section, always a cesarean section" does not necessarily hold, and that vaginal delivery should be allowed under certain circumstances. Others emphatically adhere to the dictum. The author states that Dieckmann and Greenhill are adherents.

Indications for cesarean section have widened in recent times and as the incidence of the operation is at present 3 to 6 per cent of all deliveries, every obstetrician will have under his care, from time to time, pregnancies in patients who have previously undergone cesarean section.

The author gives a series of cases of deliveries following cesarean section at the Peninsula Maternity Hospital, Cape Town, from January 1948 to December 1952, stating that of 12,608 patients 107 had previously undergone cesarean section. Of these, 62, or 58 per cent, were subjected to a repeat cesarean section, and 45, or 42 per cent, had vaginal deliveries.

There was a difference in the duration of labor in patients who had had previous vaginal deliveries and those who had not; the patients who had had a previous cesarean section before were in labor longer. The average duration of labor in patients who had previously had both a cesarean section and a vaginal delivery was twenty-four hours and forty-four minutes.

Dissolution of the uterine scar is the chief danger when vaginal delivery is allowed in a previously sectioned patient. This risk, however, is not altogether avoided repeating the section, as rupture may occur during pregnancy.

The healing of uterine incisions has been investigated by various authorities and there are two schools of thought on the subject. According to Schwarz, Paddock and Bostnick, the healing process occurs chiefly by fibroblastic proliferation along the approximated edges of the incision. Fibroblasts then enter the spaces between adjacent muscle bundles, and shrinkage of the scar follows. After two or more weeks it may be difficult to demonstrate the line of the incision with the hematoxylin and eosin stain, but van Gieson's stain may still demonstrate it. All, however, agree that scar-tissue is formed in the poorly united incision.

Adair and Gordon and Rosenthal are of the opinion that there is a cumulative maternal risk in repeat sections, and Strachan supports this view. Intra-uterine manipulations are particularly dangerous to a previously sectioned patient, because the state of the scar may be such that an increase in intra-uterine pressure may be all that is needed to produce disruption. Repeated cesarean sections are often performed after the onset of labor, and some uteri may rupture before the operation.

In assessing the advisability of a vaginal delivery certain investigations should be carried out, including roentgen pelvimetry. One should obtain a detailed history of the previous cesarean section. As the tendency to rupture is much less with a lower segment scar than after a classic cesarean section, it is safer to allow a vaginal delivery after the former operation. If previous vaginal deliveries are reported, birth *per vias naturales* may be justified in certain cases.

Such factors as polyhydramnios, multiparity, very large infants, and multiple cesarean sections are considered important in causation of subsequent rupture. A pendulous abdomen, by putting the posterior vaginal wall on the stretch, may also contribute to the likelihood of rupture.

Phaneuf has stated that in cases of frank intra-uterine infection he favors vaginal delivery if at all possible. In these circumstances each case should be treated on its own merits.

GILBERT F. DOUGLAS, M.D.

Statistical Review of Twenty-Two Thousand Cases Examined by Cervical Smears. Kimmelstiel, P.; Pixley, R. T., and Crawford, J., North Carolina M. J. 1954, 15:538, 1954.

This paper represents a statistical analysis of vaginal and cervical smears in 22,000 cases examined during a three-year period in a cytologic laboratory serving a community of approximately 140,000 inhabitants and financially entirely self-supporting. The largest volume of material studied is from physicians in private practice who have been including vaginal smears in the routine examination of their patients at a rapidly increasing rate. Though most physicians avail themselves of the facilities, the largest number of smears were received from gynecologists and surgeons.

In accordance with past experience, direct smears from cervical rather than from vaginal fluid are preferable.

The incidence of abnormal cells was 16 per thousand. This relatively high incidence of positive reports is important, since further investigation of the patient is indicated in all cases in which atypical, doubtful or cancerous cells are observed, even though further analysis will show that only about one-half of these patients actually had cancer.

Nine-tenths per cent (354 patients) were found to have cancer, confirmed by examination of tissue. Included in the 354 cases were carcinoma *in situ*, infiltrating carcinoma and previously treated carcinoma. Also included were cases in which diagnosis was known and cases in which it was unexpected.

Although the report of definite cancer cells in smears offers a very strong suggestion that carcinoma will be found in biopsies, the authors' statistics have shown a minimum error of 2 per cent. To insure greater security, the smear should be repeated. This is all the more indicated because a positive cytologic diagnosis should be confirmed by thick cone biopsy rather than by spot biopsy.

This study shows that cancer was present in almost 2 of 1,000 cases in which diagnosis had not been suspected from the history and in which careful examination had shown no cervical lesions. Cancer was detected in almost 4 of 1,000 cases in which routine examination revealed changes in the cervix classified as cervicitis, not possibly cancer, and in which no biopsy specimens have been taken without a positive smear.

The greatest use of applied cytology in study lies in its value as a screening method. It functions only to a minor extent as a diagnostic tool. If its major purpose is the detection of unsuspected cancer, it becomes necessary to screen large segments of the population. This can be done effectively only if two major conditions are fulfilled: (1) The cost must be in keeping with the benefit derived from the procedure, and (2) the public must be informed of its potential value and the existence of the facilities.

W. E. NORTH, M.D.

A Five-Year Survey of Cesarean Sections. Gershenfeld, D. B., and Sarel, L. E., J. Newark Beth Israel Hospital 5:221, 1954.

This survey covers 860 cesarean sections performed in 14,715 deliveries from 1949 to 1952. The most frequent indication was fetopelvic disproportion; the second most frequent was previous cesarean section, and the third was complication by hemorrhage.

The predominant operation was transverse cesarean section of the lower uterine segment. Spinal anesthesia was employed in about 95 per cent of the cases, and the patient was sterilized in 7 per cent. The maternal mortality rate was 0.23 per cent.

EDMUND LISSACK, M.D.

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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COLLÈGE INTERNATIONAL DES CHIRURGIENS
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The Journal of the
International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Vol. XXIII MAY, 1955 No. 5

Original Articles

Control of the Cerebral Fluid Pressure State During Operations within the Cranial Cavity

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PHILADELPHIA, PENNSYLVANIA

THE management of increased intracranial pressure and the securing of maximum relaxation of the normal brain for precision procedures deep within the cranial cavity are problems of paramount importance if success is to be achieved in brain operations. How often in the past have pioneers in neurosurgery opened the skull and dura and observed the horrifying spectacle of a brain cortex mushrooming out and bursting open like the explosion effect from an atom bomb. As far as the patient was concerned, its crippling brain damage was often just as severe as that caused by any nuclear fission reaction to which he might have been exposed. It was not uncommon for the surgeon to remark in a frustrated manner that "brain edema" or the irritating effects of the ether anesthesia was the factor defeating the surgeon's purpose. Frantic but futile attempts were usually made to absorb the "edema" by intravenous administration of a hypertonic solution of dextrose, sucrose or salt, but the operation practically always ended by stripping off the bone flap, and, if gracious providence did not end the sufferer's life, there remained a huge brain hernia to advertise to the world the failure of another brain operation. It is little wonder that the neurosurgeon of today has difficulty in convincing medical men as well as laymen that lives can be saved by operations on the brain, and without the grotesque aftermath of a massive protruding extra-

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From Jefferson Medical College, Philadelphia.
Submitted for publication Feb. 26, 1955.

cranial brain mass which too often resulted in the growth of a repulsive, ill-smelling, incurable brain fungus. Air injection and cerebral arteriographic procedures now make precise localization of brain tumor an everyday experience, so that craniotomy can always be performed directly over the lesion. Such diagnostic accuracy, combined with improvement in the technic of tumor excision and with precision control of intracranial pressure, makes surgical treatment of the brain just as scientifically rewarding as is surgical treatment of any other organ of the body. Many a recent student has completed his residency in a busy neurosurgical clinic where brain operations are commonplace, without having seen a single hernia of the brain.

The anesthesia is extremely important in maintaining a relaxed brain within the skull. Methods that permit straining, coughing and rapid deep breathing, and cause intracranial venous congestion, must be avoided. Fortunately pentothal sodium, which causes none of these effects, is available and is now in common use in many neurosurgical clinics. For some years, my own staff has used only pentothal for operations on the nervous system. No inflammable inhalation anesthetic agent is permitted in the operating room. Endotracheal tubes are no longer employed even for cerebellar or high cervical cord lesions. With procaine infiltration of the wound and a small dose of preoperative narcotic, every operation on the spine and skull can be much more successfully accomplished than with the use of the other common anesthetic agents.

Venous congestion and brain bulk can be further reduced by proper positioning of the patient. All brain operations, in my opinion, should be performed with the patient in a completely erect or semi-erect posture, to promote the rapid return of cerebral blood from the head to the heart and lower portions of the body. Venous blood serves no purpose in the brain tissues, and when it is rapidly drained from the large cerebral veins through the jugulars there is improved arterial circulation, which minimizes cellular edema and excretion of cerebrospinal fluid. The dangers of the erect position have been grossly exaggerated. The only hazard is that of air emboli from the suction effect within the veins, principally those which pass from soft tissues into the skull bone, or the large cortical veins where they enter the superior sagittal sinus. When reasonable precautions are taken to prevent the entrance of air through these channels the erect position becomes a safe one. The erect posture has been criticized because it was thought to encourage a drop in blood pressure and cause syncope; however, I have never seen a person die from these causes, and recent experiences with operations done at low arterial pressures induced by cooling and hexamethonium bromide dispel the myth of this danger. In fact, hexamethonium bromide has been extremely useful in reducing arterial hemorrhage during the removal of certain types of highly vascularized tumor.

When the foregoing conditions have been properly met and cystic fluids have been evacuated, there often remains the ever-present problem of the rapid formation of cerebrospinal fluid and its accumulation under pressure in the subarachnoid and ventricular systems. Opening the skull often relaxes the normal intracranial pressure, thereby encouraging the formation of fluids within these cavities. It is, indeed, a common experience to see the brain pushing into the surgeon's operating field as the operation progresses, at times completely defeating his anticipated surgical therapy and making mandatory the withdrawal of his attack on the lesion.

Cerebrospinal fluid can be removed from the subarachnoid space and ventricles under complete control, by the employment of technics that are now well established but not universally understood or used. Continuous drainage from each of these spaces will be considered in turn.

Continuous Spinal Drainage.—Continuous spinal drainage is indicated in most supratentorial operations for tumor, aneurysm or resection of the cortex, even in the presence of known increased intracranial pressure with headache and choked discs. It can be used safely and is advised for posterior fossa operations in the absence of brain tumor (e.g., operations for tic douloureux and tractotomies on the brain stem). It should be employed for tumors and vascular lesions of the hypophysial region but should be combined with ventricular drainage in blockage of the third ventricle to obtain maximum exposure and prevent hypothalamic damage.

It is contraindicated for stuporous and comatose patients, in whose cases evacuation of a fluid pocket or temporary decompression of a solid tumor offers a better chance of surgical success. In cases of brain abscess it is wise to avoid spinal drainage, because it is advisable to leave the subdural space closed directly over the abscess cavity by fluid pressure to prevent widespread filling of this space with purulent exudate after the drainage plug has been inserted into it. Even here it may be advisable to use intermittent withdrawal of spinal fluid through a fine needle, to prevent rupture of a lateral ventricle into the abscess cavity. It is not to be employed in the presence of tumors of the third or fourth ventricle or of the posterior fossae.

In the technic of continuous spinal drainage it is important that the operating chair be constructed for brain operations. Such a chair as is shown in Figure 1, providing for partly or completely upright positioning of the patient, was modified by George Pilling and Son from a dental chair. This chair will descend to a very low level and ascend to a high one, as controlled by simple pedal pressure. An adjustable footboard keeps the patient from sliding downward out of position. The third essential in the chair construction is a cut-away notch at the bottom of the chair back, through which the catheter for spinal drainage protrudes. This prevents pressure and crimping occlusion of the catheter.

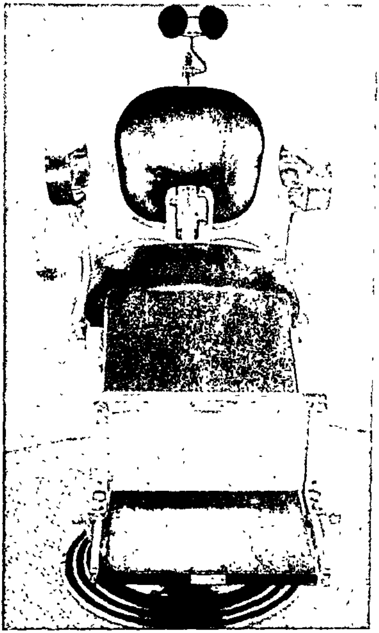

Fig. 1.—Brain operating chair with cut-away area in the back rest to permit the spinal drainage tubing to pass freely out of the spine without pressure on it.

Method of Use.—Spinal drainage may be instituted with or without an interspinous catheter-holding device. Customarily the mandril is not used; however,

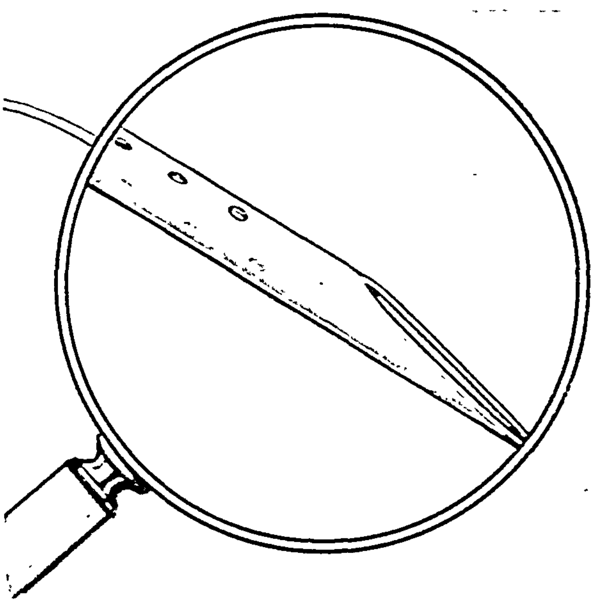

Fig. 2.—Polyethylene drainage tubing, with side holes at top, for spinal drainage. The tip must be properly beveled and the holes cleanly drilled.

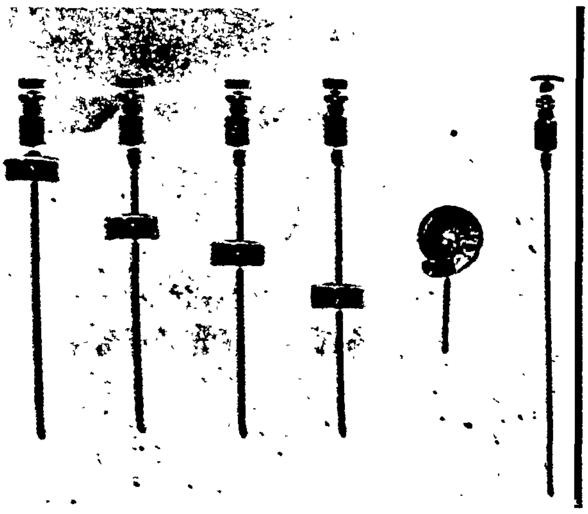

Fig. 3.—Interspinous mandrils for holding the polyethylene tubing securely in place. The mandrils are of four different lengths. The top of the mandril has a spring clip which holds the catheter to the mandril. A special thin-walled spinal needle is shown.

when prolonged drainage is needed for subarachnoid hemorrhage or meningitis it is recommended that a mandril be employed to prevent crimping and withdrawal of the tubing as the restless patient rolls about in bed.

Polyethylene catheters, properly beveled at the tip so that they may be easily inserted upward or downward in the spinal canal, are employed (Fig. 2). Six small side holes, extending along the tubing for 4 cm. above the tip, makes it virtually impossible for arachnoid or spinal roots to block the outflow of fluid from the spinal canal once the catheter has been properly placed in the subarachnoid space. Aqueous zephiran (R) solution is used for cold sterilization of the polyethylene tubing. It should be thoroughly rinsed free of this antiseptic with salt solution before it is inserted. The catheters are made from commercial polyethylene tubing of the largest size that will slide through a thin-walled 16-gauge special make spinal needle, to be described. Each catheter is cut 24 cm. long.

The mandrils are made of four lengths, to fit persons of various sizes and adiposity (Fig. 3). A length must be selected that will securely fix the mandril in the interspinal ligament and almost reach the epidural space. This length can be accurately measured by first puncturing the dura with a 22-gauge spinal needle. If a mandril of inadequate length is used, it will not be held securely between the spinous processes. A skin puncture with a spear-pointed knife is made to facilitate passing the mandril and its stylet. The mandril is inserted between the third and fourth lumbar spinous processes, precisely in the midline and completely up to its base. This may be facilitated by placing the patient in the erect sitting position. After withdrawal of the puncturing stylet, a spinal puncture needle (Becton-Dickinson and Company, 16-gauge, 3¾ inch, Special Needle T462LNR, 4 mm. bevel length) is inserted through the mandril, and the dura is punctured. The catheter, its external end blocked by a tiny metal plug (tip of a No. 10 brass safety pin), is now inserted to the desired depth. The needle opening at the bevel determines the direction the tubing will take. By noting the bevel on the withdrawn needle stylet one can always determine the position of the needle opening, and the direction (up or down) that the catheter will follow when it is inserted. I usually prefer to direct the catheter upward toward the conus. Once inserted to the required depth, the spinal needle is withdrawn over the catheter, and the catheter is securely locked in place by the tension spring on the mandril base. One should never attempt to withdraw the catheter with the needle in place, since the cutting edge may cut through it, leaving a piece of catheter in the spinal canal. After removal of the tiny plug in the outer end of the catheter, a Touhey catheter adapter is tightly fixed on to it, or a 20-gauge needle may be inserted tightly into it. This in turn is fastened to a 3-foot length of rubber tubing by means of a male Leur-lok adapter on which a stopcock control is fitted at the other end. The stopcock is either connected with a syringe or dropped into a sterile medicine glass (Fig. 4). The patient can now be placed in any position desired after the mandril has been covered with a gauze dressing fastened securely by adhesive tape. The fluid is permitted to drip out, as room is needed within the cranial cavity.

If the mandril is not used, the polyethylene tubing is passed directly through the needle in a conventional manner and secured with adhesive tape to make certain that it will not be displaced. In use the tubing drains into a 1-ounce medicine glass held by the anesthetist, who indicates the amount released with each 10 cc. that flows out. The surgeon directs that the fluid be withdrawn at his command, as conditions require. Caution must be used when the trephine holes are first made through the skull not to permit stripping of the dura from the skull over an unnecessarily large area by negative pressure. This is to be watched for closely in *children, as in them the dura is loosely attached to the skull.* Should this tendency occur, it is easily prevented by making a tiny hole in the dura through which air may pass into the subdural space. For the same reason, meticulous closure of the dura with its attachment to the bone edges by sutures is advisable. Any separation of the dura may promote the formation of extradural hematoma.

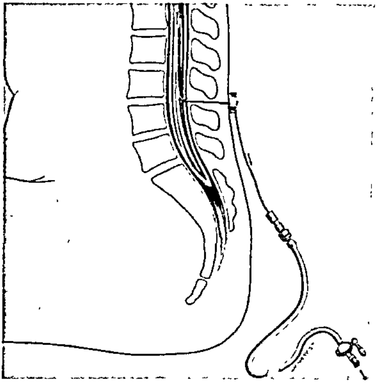

Fig. 4.—The catheter secured by the mandril to the spinous processes is shown in place; also the proper connections and the stopcock for controlling the flow.

Ventricular Drainage.—Most tumors of the midline and posterior fossae produce enlargement of the lateral ventricles. Simple puncture drainage is often adequate to provide room for the necessary surgical maneuvers. Occasionally it is advisable to institute prolonged ventricular drainage by means of a catheter inserted directly into the lateral ventricle. In operations requiring maximum fluid drainage (e.g., for aneurysms of the circle of Willis) it is recommended that both spinal and ventricular drainage be employed.

Ventricular drainage through a trephine hole o

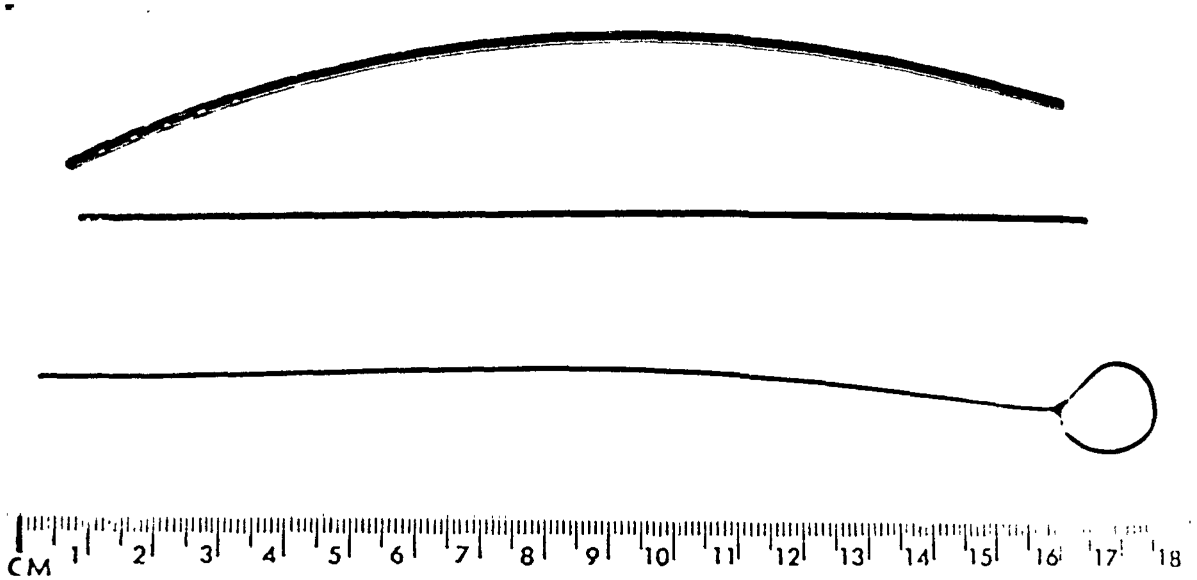

Fig. 5.—Closed-end polyethylene ventricular drainage tubing with hollow stylet tubing containing side openings for stiffening the tubing when it is inserted.

horn. The skin is sutured after coagulation and opening of an ischemic area on the brain beneath it. A large, blind-ended, smooth-tipped, polyethylene tube with several side holes near the tip is inserted to the required depth (Fig. 5). This point is ascertained by noting the fluid as it starts to drip from a hollow thin-walled metal tube which stiffens the polyethylene tubing and acts as a stylet inside it. Six tiny side holes drilled through the tip of the metal tubing permit the fluid to flow readily from the inside of the plastic tube into the metal one. The tube is held in place by binding it in the cutaneous incision with a figure-of-eight suture. Its end is closed by a wooden stopper of appropriate size, whittled from an applicator stick, to prevent air from passing into the ventricles as the fluid is expelled.

SUMMARY

Continuous controlled spinal drainage by means of a malleable (Lemmon) spinal puncture needle has been used for the reduction of intracranial pressure in numerous intracranial operations for many years. Various unreliable catheter technics have also been employed. Puncture by ventricular needle has been a life-saving device since Dandy discovered a method of localization of brain tumors by intraventricular injection of air, followed by roentgenographic studies of the outlined ventricular pattern. The present contribution to the development of the technics for decreasing intracranial pressure during operations on the brain should reduce the operative mortality rate and improve the end results of these most difficult procedures. The methods described have been used with increasing success and satisfaction as knowledge and experience have increased their value.

ZUSAMMENFASSUNG

Die ununterbrochene regulierte Dränerung der Rückenmarksflüssigkeit mit Hilfe einer streckbaren Rückenmarkspunktionskanüle (Lemmon) wird seit vielen Jahren zur Herabsetzung des Hirndrucks bei vielen Operationen verwendet. Ausserdem gibt es noch verschiedene unzuverlässige Kathetertechniken, die ebenfalls in Gebrauch sind. Seit Dandys Entdeckung des

Verfahrens der Lokalisation von Hirntumoren mittels Lufteinblasung in die Ventrikel und anschliessender Röntgenuntersuchung ist die Punktion mit der Ventrikelkanüle zu einem lebensrettenden Eingriff geworden. Der vorliegende Beitrag zur Entwicklung der Technik der Herabsetzung des Hirndrucks im Verlaufe von Hirnoperationen dürfte zur Verminderung der Operationssterblichkeit und zur Verbesserung der Endergebnisse dieser höchst schwierigen Eingriffe beitragen. Die beschriebenen Methoden sind mit wachsendem Erfolg angewendet worden, und zunehmende Erfahrung führt zur Erhöhung ihrer Brauchbarkeit.

RIASSUNTO

Allo scopo di diminuire la pressione intracranica durante numerosi interventi sul cervello è stato instaurato un drenaggio spirale continuo e controllato a mezzo di uno speciale ago da rachicentesi o di cateteri vari. La puntura dei ventricoli ha rappresentato un importante espediente fin da quando Dandy ideò un metodo di localizzazione dei tumori cerebrali a mezzo di iniezione intraventricolare di aria seguita da studi radiografici della morfologia ventricolare in tal modo messa in evidenza. Il presentecontributo allo sviluppo delle tecniche di decompressione intracranica in corso di interventi sul cervello potrà ridurre la mortalità operatoria e migliorare i risultati di tali difficili operazioni. I metodi descritti sono stati usati con sempre maggior successo e soddisfazione.

RÉSUMÉ

Le drainage spinal contrôlé continu, au moyen d'une aiguille malléable (Lemmon) à ponction lombaire, a été employé dans de nombreuses opérations et pendant plusieurs années afin de réduire la pression intracrânienne. Différentes techniques peu sûres de cathétérisme ont aussi été employées. La ponction par une aiguille ventriculaire a sauvé bien des vies depuis que Dandy a découvert un procédé de localisation dos tumours cérébrales; lequel consiste à injecter de l'air par voie intraventriculaire puis à étudier les radiographies de l'image ventriculaire esquissée. La présente contribution au développement des techniques destinées à diminuer la pression intracranienne pendant les opérations sur le cerveau réduirait le taux de mortalité opératoire et améliorerait les résultats finaux de ces opérations extrêmement difficiles. Les méthodes décrites ont donné satisfaction et leur succès s'accroit parce que science et expérience en ont augmenté la valeur.

RESUMEN

A drenagem espinal controlada contínua, por meio de uma agulha de punção espinal maleável (Lemmon), tem sido usada para a redução da pressão intracranial em numerosas operações durante muitos anos. Também têm sido empregadas várias técnicas não satisfatórias, empregando cateteres. A punção por meio da agulha ventricular tem sido salvadora, desde que Dandy descobriu um método de localização de tumores cerebrais por meio da injeção intraventricular de ar, seguida de estudos radiológicos do panorama ventricular. A presente contribuição ao desenvolvimento das técnicas que visam a diminuição da pressão intracraniana durante operações no cérebro deve reduzir a mortalidade operatória, bem como melhorar os resultados finais dêsses processos tão difíceis. Os métodos descritos têm sido usados com sucesso e satisfação crescentes, visto que o conhecimento e a experiência aumentaram seu valôr.

Cholecystoduodenostomy

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THE surgeon who performs a cholecystoduodenal anastomosis, nearly always faces the question of the dimensions that should be given to the anastomotic mouth. If he makes it shorter than 2 or 3 cm. besides the reflux he can be sure that, in addition to the reflux, late cicatricial stenosis will appear. If he makes it longer, in consequence of the inflammatory infiltration, there will be increased dangers to the patient involved in the passage of the digestive material to the biliary canals—cholecystitis, ascendant suppurating cholangitis, multiple abscesses of the hepatic parenchyma, atrophy of the hepatic cells, and glandular insufficiency, which, in most instances, cause the patient's death.

In view of these facts, such anastomoses have been severely criticized and lately are being executed only as a last resource.

The various methods proposed for correction of these inconveniences do not correspond to the expectations and, furthermore, present serious inconveniences of their own:

In the intraparietal cholecystoduodenostomy of Lambert; (a) the very small anastomotic mouth tends to become stenotic later on; (b) the suture of the interment of the walls of the vesicle diminishes the duodenal cavity, disturbing its peristalsis; and (c) dissection of the vesicle from its hepatic bed, performed on patients with serious jaundice, not only brings about hemorrhage of varying proportions but leaves a bloody surface which facilitates the formation of postoperative adhesions, etc.

In cholecystoduodenal anastomosis with the Duval tube, the following undesirable contingencies can be noted: (a) obliteration of the cavity of the rubber tube, caused by the deposit of biliary concretions; (b) the necessity for a second intervention to extract the drain retained as a foreign body; and (c) cicatricial stenosis of the anastomotic mouth after spontaneous elimination of the same, etc.

In 1947, in order to do away with these handicaps, I proposed two processes: the tubular cholecystoduodenostomy and tubular-papillary cholecystoduodenostomy, by means of which, at cost of the anterior wall of the vesicle, I succeeded in developing a new and simple surgical procedure (tubular process), or provided a papilla (tubular-papillary process) which, with a caliber identical to the choledochus, connects the vesicle with the duodenum.

The *tubular cholecystoduodenostomy* was performed by myself for the first time in November 1933, on a patient with obstructive jaundice caused by chronic pancreatitis. In a roentgen examination made in January of the following year, no reflux of the contrast medium to the biliary canals could be noticed, in spite of the fact that the patient had been examined in orthostatic, decubital and Trendelenburg positions under intensive compression (manual and with a ball) exercised between the second and third portions of the duodenum and associated with the

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Submitted for publication March 11, 1954.

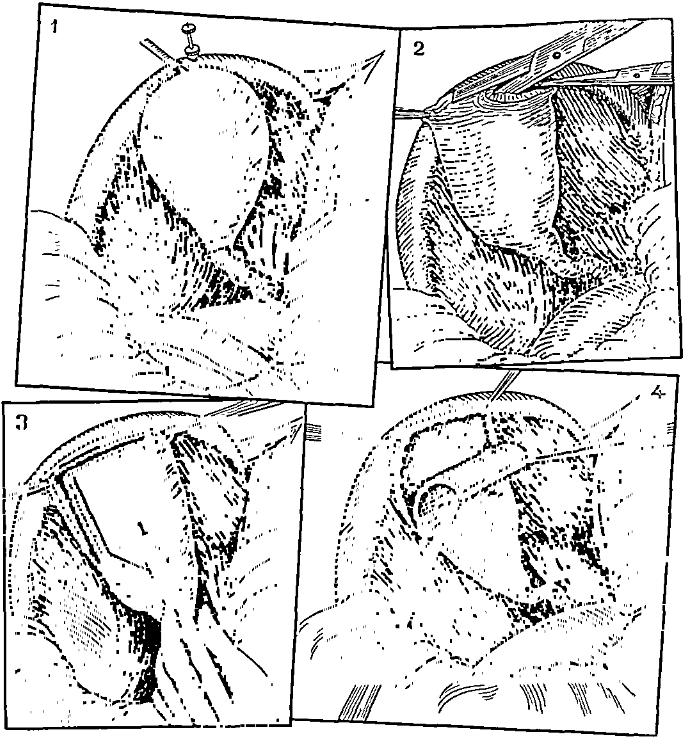

Fig. 1.—*1*, Vesicle is emptied of its contents; *2*, vesicle is opened at bottom parallel to the hepatic border; *3*, rectangular pavilion of catheter No. 1 (author's model) supplies size of remnant necessary to form new duct; *4*, remnant obtained by sectioning vesicle on both sides of catheter to an approximate length of 25 to 35 mm.

malaxation of the stomach. We did not lose sight of the patient, and in September 1954, i.e., twenty years after the operation, she was enjoying good health.

In the *tubulopapillary cholecystoduodenostomy*, an *ideal process*, the technics of which do not present any difficulties to those accustomed to abdominal surgery, the new surgical approach meets perfectly the anatomic and physiologic necessities: to conduct the bile to the point destined for it by nature and to obtain a terminal papilla, located in the cavity of the duodenum, which, functioning like a valve, is a substitute for the papilla of Vater.

Technics.—1. Two nippers are used to repair the bottom of the vesicle, a [illegible]

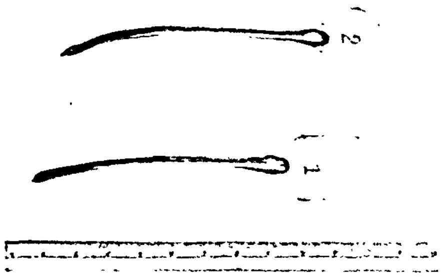

Fig. 2.—Catheters Nos. 1 and 2, author's model, seen from the front.

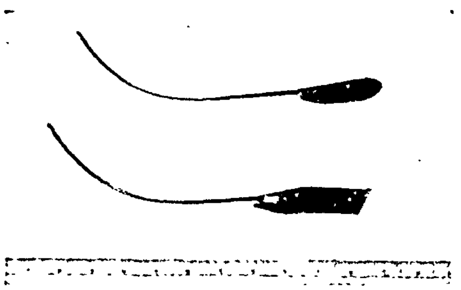

Fig. 3.—Catheters Nos. 1 and 2, author's model, seen from the side.

a trochanter connected to an aspirator the biliary contents are emptied (*1*, Fig. 1).

2. The vesicle is opened at its bottom parallel to the border of the liver. In vesicles of reduced size this incision is made near the hepatic border, while in large vesicles, its distance becomes proportionally greater, the larger the biliary reservatory is (*2*, Fig. 1).

3. The size of the remnant necessary to form the new duct is furnished by the rectangular pavilion of catheter No. 1 (my own model), which is 22 mm. wide (*3*, Fig. 1 and Figs. 2 and 3).

4. In order to obtain the remnant, the vesicle is sectioned on both sides to an approximate length of 25 to 35 mm. (*4*, Fig. 1).

5. The remnant is pulled down to determine whether its length is sufficient to permit its implantation, without traction, into the angle formed by the first and second portions of the duodenum.

6. Four or 5 mm. of the terminal portion of the remnant is doubled outwardly and tied to the vesicular serosa by means of a continuous suture or with separate stitches (*5*, Fig. 4).

7. With an atraumatic needle and chromic catgut, No. 00, the sutures are placed, approaching the mucosa of both sides of the remnant to the stem of the catheter, thus forming a duct. Then the bottom of the vesicle is closed (*6* and *7*, Fig. 4).

8. One or two separate stitches join the terminal mucosa of the remnant to form the papilla (*8*, Fig. 5).

9. Once catheter No. 1 is replaced by No. 2 of a smaller size, a sero-serosa suture with an atraumatic needle having a linen, silk or cotton thread, is made (*8*, Fig. 4).

10. Once the tubulopapillary duct is finished, its terminal extremity is approximated to the duodenum to mark the place where it should be implanted.

11. In order to take better advantage of the peristaltic mechanism of the duodenal walls, as of help to the valvular function of the tubule, I modify my original technics according to the orientation of the duodenal incision. I abandoned the transverse line and made a longitudinal incision of the duodenal serosa to a length of about 1 cm. I separated the muscular fibers, introducing among them the closed legs of nippers with fine ends, which then are slowly and conveniently opened, thus permitting prolapse of the duodenal mucosa, which, once repaired with the nippers, is opened (*9*, Fig. 4).

12. The papilla is introduced into the duodenal cavity, and, with an atraumatic needle and chromic catgut No. 80, the mucosa of this organ is sutured round the tubule with the vesicular mucosa of the new papilla (*10*, Fig. 5).

13. The operation is finished by suturing the duodenal serosa to the vesicular

serosa of the tubule with silk, cotton or linen thread (*11*, Fig. 5).

Experimental Results.—Experimental work regarding tubulopapillary cholecystoduodenostomy shows the advantages of this technic over the others.

On the side of the *vesicle*, the removal of a remnant of its bottom reduces its volume (*11*, Fig. 5), but, as time goes by, it dilates and, by the end of some months, attains its original volume (Fig. 6). That fact convinces me that the biliary flow through the new duct does not proceed continuously but in an intermittent manner. The few muscular fibers (circular and longitudinal) of the duodenum that were sectioned (*A*, Fig. 7) at the operation, do not prevent the peristaltic move-

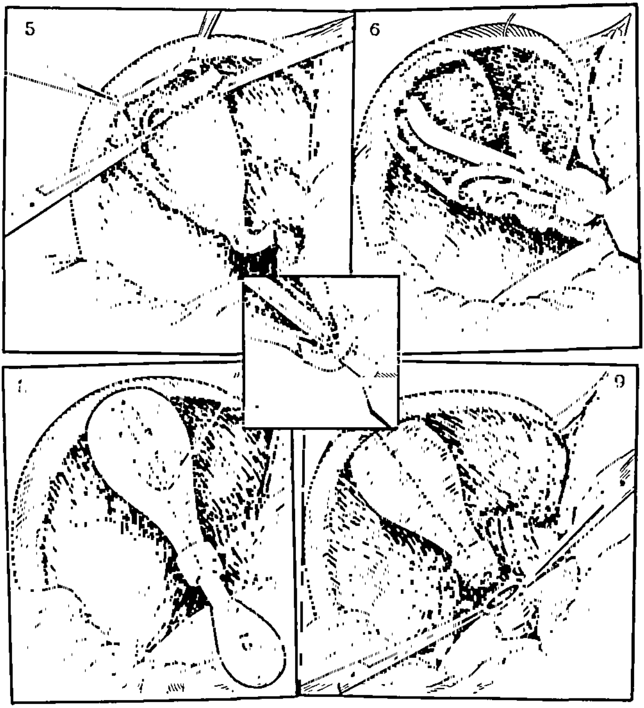

Fig. 4.—*5*, Terminal portion of remnant doubled outward and fixed to vesicular serosa; *6*, mucosa of both sides of remnant sutured above stem of catheter No. 1 to form the duct; *7*, first stitch in formation of the papilla; *8*, catheter No. 1 is replaced by No. 2, smaller, to give a second plan of serosero-serosal suture; two stitches approach the double terminal portion, and the papilla is formed; *9*, longitudinal incision of the duodenum, separation of the muscular fibers and opening of the duodenal mucosa.

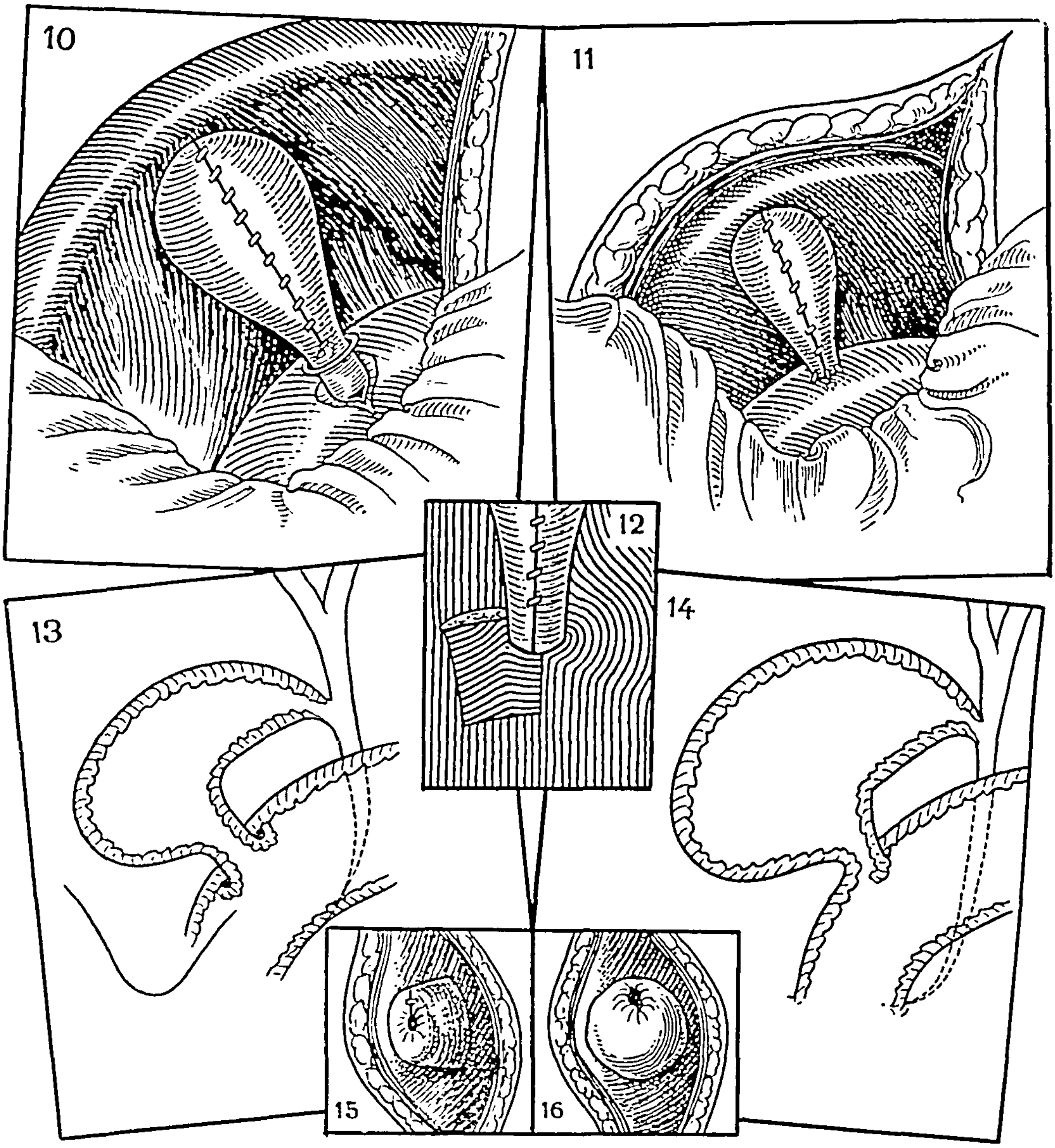

Fig. 5.—*10*, Papilla introduced into duodenal cavity suture of the mucosa of the papilla to the duodenal mucosa; *11*, suture of duodenal serosa to the vesicular serosa of the tubule; *12*, disposition of the muscular longitudinal and circular fibers of the duodenum after implantation of the tubule into the walls of this organ; *14*, tubulopapillary cholecystoduodenostomy, some time after intervention: papillary orifice is near mucosa of duodenum. Vesicular mucosa constituting papilla has taken the form of protruding border, roundish and semilunar.

ments, at the level of implantation of the tubule in that viscus, from determining the gluing of the mucosa of the new duct, closing its cavity (*B* and *C*, Fig. 7). At this time the bile accumulated in the vesicle, increased by a new quantity originating from the biliary canals and reaching a reservoir of reduced volume, penetrates into it under pressure, dilating it until equilibrium in the biliary tree is obtained. This equilibrium is established when the limit quantity of the bile reserve reaches the volume of 50 to 60 cc.

The new *surgical duct* obtained by this process has a size identical with that of the choledochus; it measures 20 to 25 mm. in length, and connects the biliary vesicle with the duodenal cavity (Fig. 6).

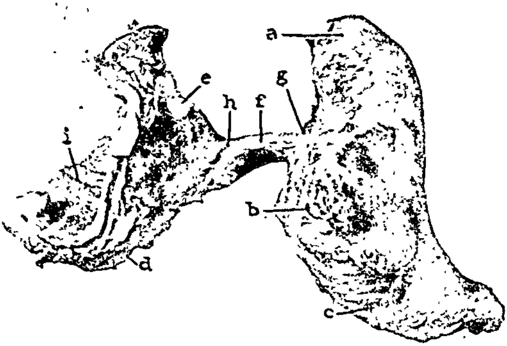

Fig. 6.—Experimental piece in which the new duct connecting the mid-third of the vesicle to the angle formed by first and second portions of duodenum can be clearly seen: *A*, bottom of the vesicle; *B*, body; *C*, colon; *G*, beginning of the new duct at the level of the vesicle; *F*, its body, and *H*, point at which it penetrates the duodenal wall, the limit of implantation being clearly seen; *E*, first portion and *D*, second portion, of duodenum; *I*, its mucosa.

The *papilla* implanted in the duodenum presents itself at operation act in a globular form, with an orifice in the middle (*15*, Fig. 5). The cicatricial retraction that takes place later on, at the level of the suturing line, determines an eccentric dislocation of that orifice, approaching it or even putting it in direct contact with the duodenal wall (*14* and *16*, Fig. 5). Consequently, the vesicular mucosa that constitutes the new papilla forms a protruding border, roundish and clearly delimited, of the mucosa of the duodenum in the major part of its extension, measuring 8 to 12 mm. in diameter (Fig. 8). This valvular disposition, together with the gluing to the walls of the tubule, which takes place during the peristaltic movements of the duodenum, protects the biliary canals, preventing ascenion of the duodenal material to the orifice of the papilla (*16*, Fig. 5; Fig. 8).

In animals which were killed after connection of the third portion of the duodenum, the water injected into its cavity through the pylorus, even under heavy pressure, did not pass to the interior of the vesicle. On the other hand, even light compression of the vesicular walls allowed passage of the bile to the duodenum.

Operative Results.—In order that the intervention may succeed, it is absolutely necessary to perform it with the aid of a good anesthesia and proper instrumental equipment, observing all technical exigencies and taking special care of the sutures, which must be made with adequate needles and threads to avoid tearing of the tissues.

The excellent immediate and late operative results obtained from tubulopapillary cholecystoduodenostomy, in cases of obstruction of the choledochus in which the vesicle can be used, show that this type of intervention definitively prevents the reflux and the later cicatricial stenosis, the serious complications which are so much

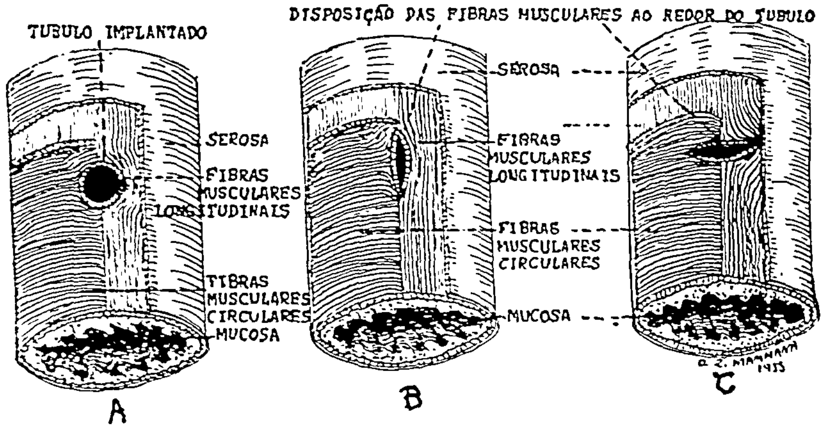
TUBULO IMPLANTADO
DISPOSIÇÃO DAS FIBRAS MUSCULARES AO REDOR DO TUBULO
SEROSA
FIBRAS MUSCULARES LONGITUDINAIS
FIBRAS MUSCULARES CIRCULARES
MUCOSA
SEROSA
FIBRAS MUSCULARES LONGITUDINAIS
FIBRAS MUSCULARES CIRCULARES
MUCOSA
A
B
C

Fig. 7.—*A*, disposition of muscular, circular and longitudinal fibers of duodenum at level of implantation of new tubulopapillary ducts. Circular fibers were sectioned in a small extension, longitudinal ones simply separated. *B*, owing to contraction of the circular muscle fibers, new duct flattens longitudinally against axis of duodenum. *C*, owing to contraction of longitudinal muscular fibers, new duct, flattens cross-sectionally against axis of duodenum.

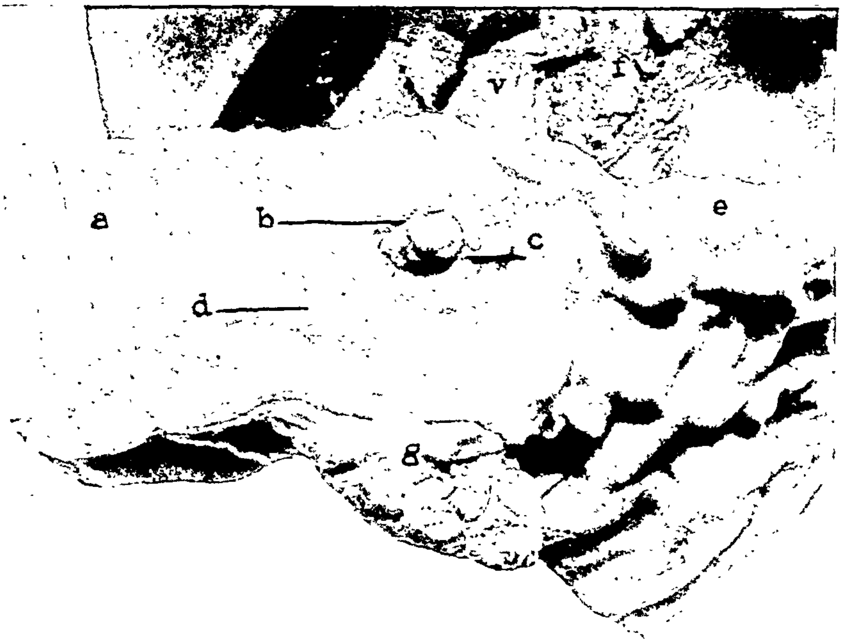

Fig. 8.—Experimental piece: Once the stomach and the duodenum are opened the following can be seen in their internal part: *A*, duodenal mucosa; *B*, new papilla; *C*, its orifice, eccentrically located; *D*, below and to the back, point at which choledochus ends naturally; *E*, gastric mucosa; *F*, liver; and pancreas; *V*, bottom of the vesicle, twelve days after the tubulopapillary cholecystoduodenostomy.

dreaded and which discredited the biliary-digestive anastomoses.

A test of the reflux of the opaque medium to the interior of the biliary canals is always made with the patient a certain time after the intervention. During those examinations the radiologist, after administering the contrast medium, squeezes the abdominal viscera by means of adequate compressors and repeated palpative maneuvers, examining the patient in various positions (orthostatic, decubital and Trendelenburg) and taking roentgenograms in each instance. In spite of these forced conditions, which never take place in the human organism during the period of digestion, the result has always been negative. To make this test, it is convenient to wait sufficiently to allow complete cicatrization of the sutures at the level of the body of the vesicle, of the new duct and of the anastomotic mouth (thirty to forty days).

Private Statistics.—I have performed the tubulopapillary cholecystoduodenostomy from 1935 to 1953 in 19 cases of obstruction of the choledochus, in 13 of which it was due to carcinoma of the pancreatic head; in 1, to multiple cysts of the pancreas; in 4, to chronic pancreatitis, and in 1, to dyskinesia of the sphincter of Oddi.

In the cases of most of the patients who called on me (or who were sent by colleagues), especially those with advanced malignant lesions, in an extreme state of organic misery seriously compromising the hepatic cell, the operation was done upon insistence of the family or as a last resort in order to relieve them of intense itching.

Of the 13 with carcinoma of the pancreatic head, 5, or 38.5 per cent, died in the hospital within varying periods. The average survival time of those remaining was eleven months.

The patient with multiple cysts of the pancreas lived for two years after the operation.

In those with chronic pancreatitis, the operative mortality rate was zero and the operation exercised a beneficent influence on the general state of the patients and on the inflammatory process of the gland. In a case of concomitant duodenal ulcer of 8 years' duration, the tubulopapillary cholecystoduodenostomy cured the ulcer clinically and radiologically within a relatively short time. As to the patients with pancreatitis, the first one, operated on in 1936, went abroad, and I heard nothing more from him; those operated on in 1947, 1949 and 1953 respectively do not present any abnormalities at the time of writing.

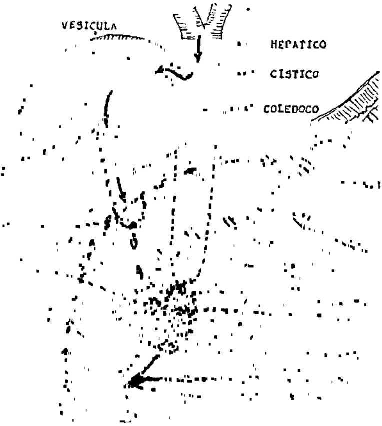

Fig. 9.—Schematic drawing of tubulopapillary cholecystoduodenostomy, showing disposition of papilla near pylorus. Sketch shows an ulcer at second portion of duodenum, penetrating into the head of the pancreas, with limited pancreatitis and complete stenosis of the intra-pancreatic portion of the choledochus. Bile empties over ulcer, spreading over mucosa of supersphincteric region to pylorus.

As to the patient with dyskinesia of the sphincter of Oddi, operated on recently, he has improved and shows no abnormalities.

Among these cases I have not included that of a patient who [illegible] a t[illegible]ular cholecystoduodenost[illegible] [illegible]s, [illegible] is still enjoying g[illegible]

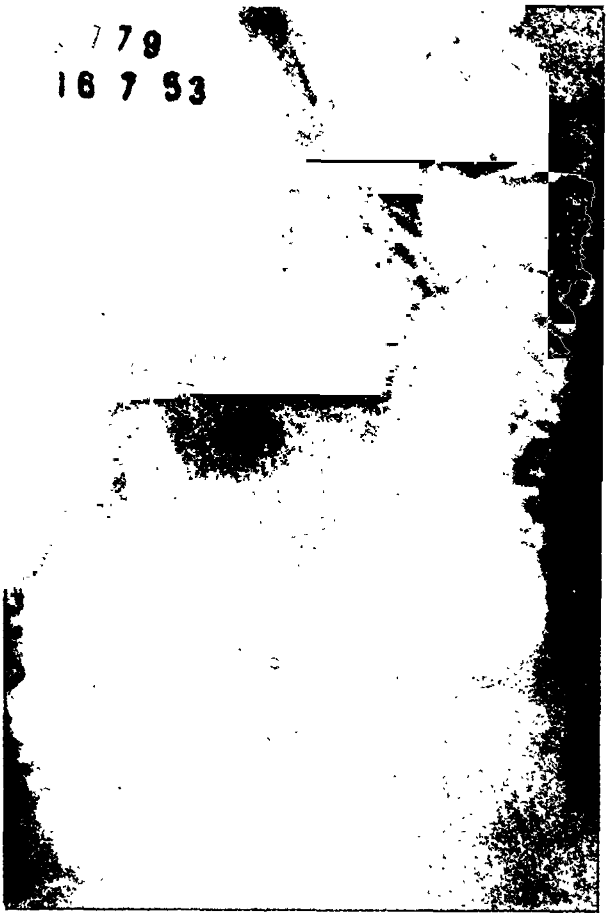

Fig. 10.—Roentgenogram of stomach and duodenum taken on July 17, 1953.

REPORT OF A CASE

At the end of July 1953 I had the opportunity to operate on a man with mechanical obstructive jaundice, who had had, since 1945, a chronic duodenal ulcer, which some days earlier, in a phase of increase, had perforated into the head of the pancreas. The excellent result obtained in this case, which did not only cure the jaundice but brought about clinical and radiologic cure of the ulcer within a relatively short time, justifies its presentation. The patient in question was J.C.R., white, Brazilian, married, 54 years of age, born in Rio Grande do Sul. In a series of roentgenograms of the stomach taken on May 15, 1946, a small niche of a chronic ulcer of the duodenal bulb was noticed. On June 21, 1953, after violent pain in the umbilical region, accompanied by diarrhea with black stools, jaundice developed.

A new series of roentgen films of the stomach and the duodenum, made on July 17, showed a deformed duodenal bulb with lengthened recesses, forming paraulcerous diverticula, with a typical niche of chronic ulcer in the bulbar curvature (Figs. 9 and 10).

Operation.—In the posterior portion of the duodenum, an ulcer penetrating into the head of the pancreas was observed. The pancreatic parenchyma, invaded by the inflammatory periulcerous process, big as a nut, was hardened, and the cavity of the choledochus was stenotic. Operative cholangiograms taken through the vesicle revealed a wall of contrast medium in the choledochus, at the level of the head of the pancreas (Fig. 11).

I carried out the tubulopapillary cholecystoduodenostomy by placing the papilla in such a way as not to exercise any traction upon the sutures of the anastomotic mouth, at the superior border of the duodenum, near the pylorus, in a place where the bile passed to empty itself over the ulcer (Fig. 9).

On the day after the operation, the belches, pains, burning in the stomach and other gastric disturbances, which the patient had felt since 1945, disappeared. On the fifth day there was a biliary fistula, which closed after four days. The patient was considered cured on August 12.

A roentgenogram taken by Dr. J. M. Cabelo Campos on September 11, forty-one days after the operation, revealed complete cicatrization of the duodenal ulcer and absence of reflux of the contrast medium in the digestive canal to the biliary canal. The report on this examination reads as follows:

"*Stomach:* Normotonic stomach, with the region of the antrum bent backwards; normal mobility, peristalsis, motility and sensibility. Normal aspect of relief of the gastric mucous.

Duodenum: Duodenal bulb pulled upward and backward, of normal form and contour. *Disappearance of the niche of ulcer observed in previous examination, made on July 17, 1953. Radiologic cure of the ulcerous lesion.* Duodenal arch filling normally in its entire extension. Outward from the upper part of the second portion of the duodenum, some conglomerated calcified shadows are noted, possibly of calcified ganglions."

The roentgen examination was directed in such a way as to verify not only the evolution of the ulcerous process in the duodenal bulb but the conditions of the anastomosis made between the bulb and the biliary canal. Radiologically it was not possible to point out the exact site of that anastomosis, because of the regularity encountered in the contours of the bulb and of the second portion of the duodenum, and in the regular disposition of the relief of the mucosa of these duodenal segments. The patient was examined in the upright, in dorsal, decubital, Trendelenburg, and oblique positions, with adequate compressors and repeated and forced palpative maneuvers without causing reflux of the contrast medium to the biliary ducts. These examinations, made in the various positions mentioned, were controlled by means of roentgenograms, which did not reveal the presence of the contrast medium in the biliary canal (Figs. 12 and 13).

The rapidity with which, in this patient, clinical cure was obtained and later confirmed by the radiologic cure of the duodenal ulcer penetrating into the pancreas' head, convinces me that juxtapyloric duodenal ulcers, or ulcers of the bulb, find adequate conditions for their formation in persons whose bile, which reaches the duodenum through the choledochus, owing to various factors, does not reflow and does not spread over the mucosa of the zone between the pylorus and the papilla of Vater, or if it reflows, does not keep in contact with the same for a sufficient time to exercise its beneficial physiologic effect.

The bile would act in such cases as a neutralizer of the strongly acid gastric juice, or due to transforming physiologic processes of the middle determined by its component parts (biliary salts, mucin, biliary acids, etc.).

The protective action of the bile upon the duodenal mucosa is noticeable if one considers the fact that in the lower portion of the duodenum, practically located below the mouth of the choledochus, no ulcers are encountered, while they are frequently encountered in the supersphincteric zone, especially at the level of the juxtapyloric portion of the bulb.

The reflux and diffusion of the bile to the pyloric region which would take place normally would be hampered, in persons

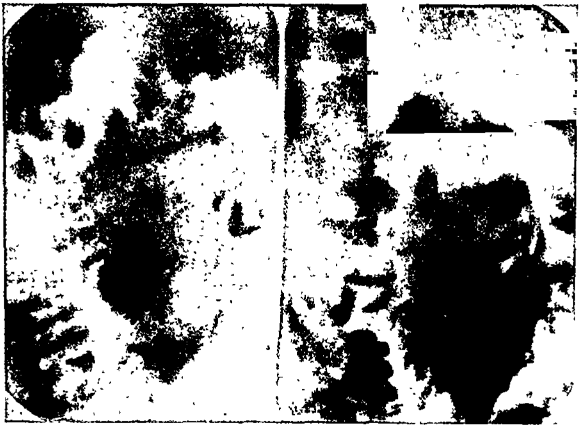

Fig. 11.—Roentgenogram of duodenum taken on July 17, 1953. dicates niche of ulcer in small bulbar curvature.

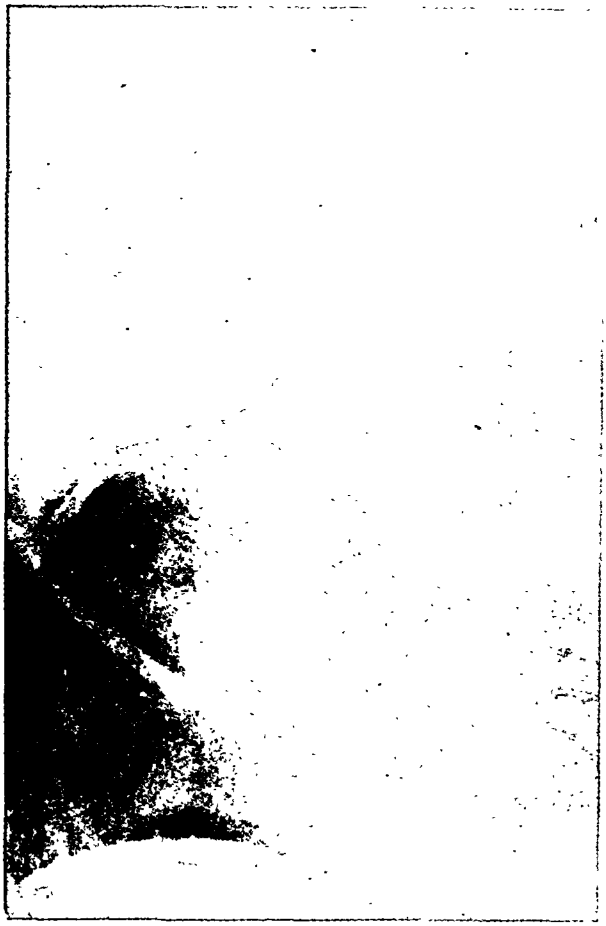

Fig. 12.—Operative cholangiogram of patient J. C. R. Contrast, medium, filling vesicle, has passed cystic canal and continued easily to principal biliary and intrahepatic canals but has not advanced beyond intrapancreatic portion of choledochus.

with ulcer, by various factors, among which the following are the most prevalent: (a) special disposition of the folds of the duodenal mucosa at the level of the supersphincteric region; (b) orientation from top to bottom, tangentially to the walls of the duodenum, of the trajectory of the terminal portion of the choledochus, at the level of the papilla of Vater; (c) simple duodenal hyperkinesia; and (d) simple biliary hyperkinesia or biliary hyperkinesia associated with duodenal hyperkinesia, frequently observed in emotional and extremely nervous persons.

SUMMARY

The technic and use of cholecystoduodenostomy are discussed. The author describes two technics proposed by himself in 1954: tubular cholecystoduodenostomy and tubulopapillary cholecystoduodenostomy, the latter of which he considers the ideal method. Technical points are explained and illustrated in detail.

ZUSAMMENFASSUNG

Der Verfasser erörtert die Technik und die Anwendung der Cholezystoduodenostomie und beschreibt zwei von ihm im

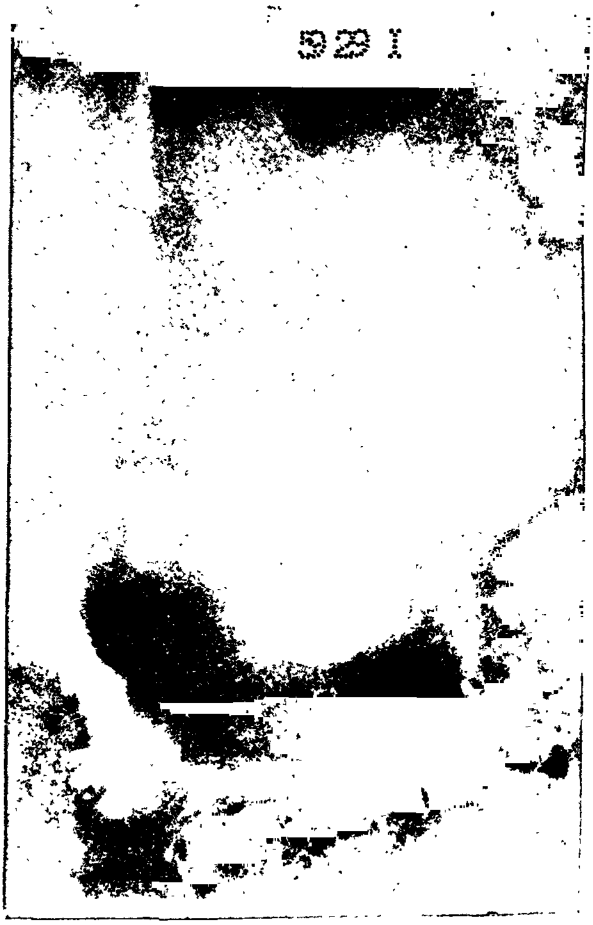

Fig. 13.—Roentgenogram of stomach and duodenum taken on Sept. 11, 1953. Regularity of contours of bulb at level of tubulopapillary anastomosis, at which it is not possible to distinguish, roentgenographically, exact site of anastomosis. Note disappearance of the picture in ulcer niche.

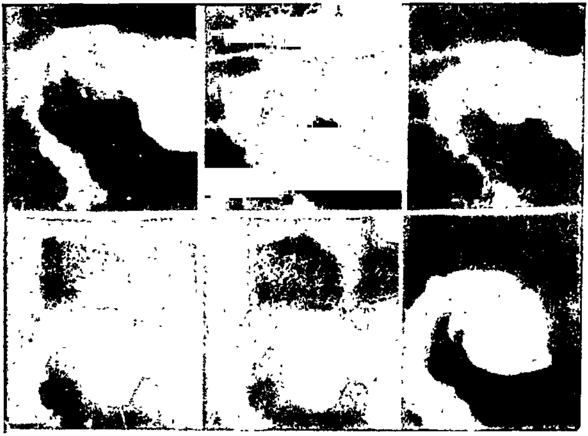

Fig. 14.—Roentgenogram of ducdenum taken on Sept. 11, 1953, showing various phases of filling while repeated palpatory maneuvers are made and also with adequate compressors, to force passage of contrast medium through anastomotic mouth. Note absence of reflux and presence of contrast medium in vesicle and biliary canals. Note also disappearance of the picture in ulcer niche.

Jahre 1954 angegebene Verfahren, nämlich die tubuläre und die tubulokapilläre Cholezystoduodenostomie. Die letztere hält er für die ideale Methode. Technische Einzelheiten werden erklärt und durch Illustrationen erläutert.

RÉSUMÉ

La technique et l'utilisation de la cholécystoduodénostomie sont discutées. L'auteur décrit deux techniques proposées par lui en 1954, la seconde étant considérée par lui comme la méthode de choix. Les techniques sont expliquées et illustrées de façon détaillée.

RESUMEN

Se discute la técnica y uso de la colecistoduodenostomía. El autor describe dos técnicas propuestas por él en 1954, la colecistoduodenostomía tubular y la túbulocapilar, considerando esta última como el método ideal. Los puntos técnicos son explicados e ilustrados detalladamente.

RIASSUNTO

Vengono discusse tecniche ed indicazioni della colecisto-duodenostomia. L'autore descrive, spiegandoli e dettagliatamente illustrandoli punto per punto, due metodi da lui proposti nel 1954.

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Democracy has survived because time and again it has proved, under stress, its ability to harmonize and make productive, in every sphere of thought and action, the individual and the social instincts innate in man. In these respects it has demonstrated its superiority over all other political philosophies. All try to draw the line between the opportunities and responsibilities of the individual and those of society, but none draws it so subtly in accordance with reality as democracy.

—*Griswold*

Complete Agenesis of the Anterior Abdominal Wall in a Newborn Child, with Repair

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TWO primary defects of the anterior abdominal wall are frequently encountered in the newborn, umbilical hernia and omphalocele. A third condition, gastrochisis, or agenesis of the abdominal wall with ectopia of the abdominal viscera, is rarely encountered. A fairly extensive search of the literature revealed only 1 case.[1]

The purpose of this paper is to report a case of this type.

Umbilical hernia, a frequent occurrence in the newborn, is characterized by a defect of varying size in the recti fascia and muscles in the periumbilical area, producing a bulge of peritoneum covered by skin alone.

Omphalocele is a congenital anomaly in which the defect is within the abdominal wall and not merely at the umbilical ring. The contents of the sac have never been within the peritoneal cavity, and there is a wide separation of the fascia and muscles. Omphaloceles are covered by a thin-walled peritoneum (amniotic membrane) with no cutaneous covering.

Gross[2] reported a series of omphaloceles varying in diameter from 2 to 15 cm. In each of his reported cases, however, the fascia and recti muscles were present, although in a hypoplastic state.

In the case reported here there was bilateral total absence of skin, anterior and posterior recti sheaths, recti muscles, the external oblique muscles anteriorly, and peritoneum. The liver, the stomach, the spleen and the small and large intestines were completely denuded anteriorly (Fig. 1, *A* and *B*).

Etiologic Factors.—Umbilical hernia, according to Arey,[3] ". . . is due either to perpetuation of the transitory fetal condition or to a secondary protrusion of the viscera after primary withdrawal."

Two theories have been put forward to explain omphalocele. The first and most generally accepted is that it originates in a disproportion between the size of the peritoneal cavity and the size of its contents.

Kahle[4] stated that ". . . between the sixth and tenth week of fetal life a large portion of the intestinal tract is displaced anteriorly into a recess in the base of the umbilical cord, which communicates with the yolk sac by means of the yolk stalk. . . . This, being coupled with the enlargement of the fetal liver prior to this period, is so considerable that lack of body space forces the intestines into the expansible portion of the coelom. Subsequently when growth of the lower abdominal cavity occurs at a normal rate (which is actually an accelerated rate) there is room for the organs to return to their normal habitat. . . . If, however, the [illegible] ciently rapid, some

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Submitted for publication Dec. 28, 1954.

essarily remain outside of the cavity and the child is born with an omphalocele."

The second theory, postulated by Margulies,[5] involves failure of the mesodermal structures in the transverse septum in the third week of fetal life, resulting in omphalocele with associated anomalies such as extrophy of the bladder, diaphragmatic hernia and cardiac defects as reported by Fox.[6]

Potter[7] described a condition in which the muscles of the abdominal wall are usually present but very hypoplastic. "A more profound alteration in development dates from an earlier period of embryonic life. It is related to the formation of the body stalk by separation of the embryo from the blastocyst and usually occurs during the third week of fetal life. . . In this variety of eventration the area of cleavage is incomplete. The umbilical cord may be rudimentary or absent, a portion of the embryo remains in contact with the wall of the blastocyst. This is the area of the yolk sac and as a result the region of the anterior abdominal wall is not covered by skin but remains open and adjacent to the placenta."

Prognostic Considerations.—In the cases reported previously in the literature the prognosis for small omphaloceles (2 to 7 cm. in diameter) was approximately 75 per cent of survival after operation. When the omphalocele measured from 7 to 9 cm. in diameter, the survival rate was cut to 30 per cent. When the sacs were larger than 9 cm. in diameter the survival rate dropped to about 15 per cent.

Whenever a large portion of liver was observed in the omphalocele a grave outlook could be expected.

REPORT OF CASE

A full-term white girl weighing 5 pounds and 10 ounces (2,550 Gm.) was delivered on Aug. 15, 1954, at the St. Francis Hospital, Miami Beach (service of E. J. Thomas, M.D.). The mother, aged 40, was a primipara, married sixteen years with no previous pregnancies. The family history was essentially noncontributory. The onset of menses had occurred at the age of 12, with no aberrations of the menstrual cycles. The most recent menstrual period had occurred on Oct. 14, 1953. Pelvic examinations (Dr. Thomas) revealed a multinodular fibroid uterus, the fibroids having existed prior to pregnancy. The Rh factor was compatible. Serologic tests gave negative results. The antepartum period was uneventful. Active labor began on Aug. 15, 1954, at 4:30 a.m. The fetal heart tones remained normal. The infant was delivered uneventfully (right occipital anterior

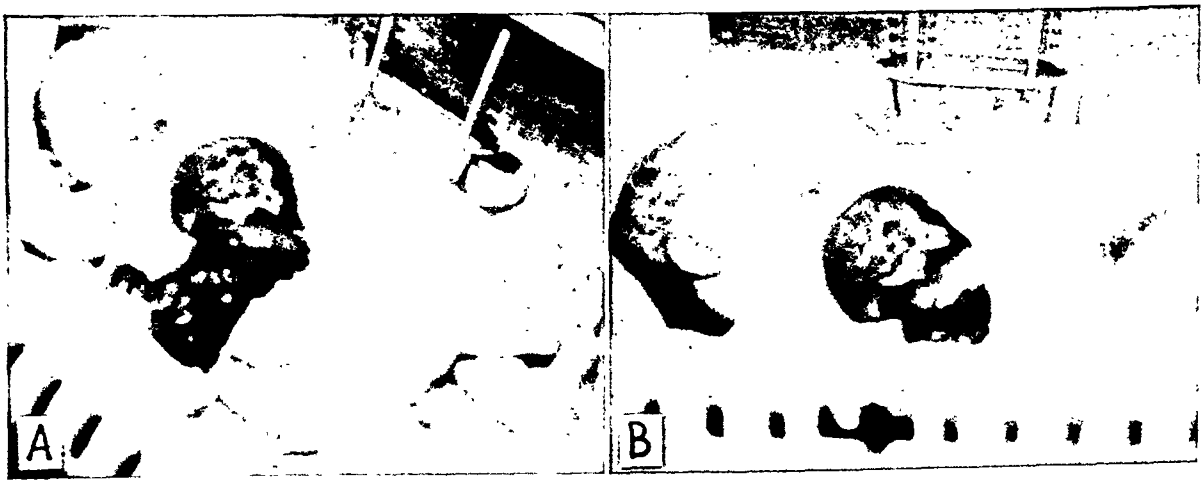

Fig. 1.—Photographs taken immediately after delivery, showing liver, stomach and small and large bowel. Note absence of peritoneal or omphalomesenteric remnants.

position) at 9:30 a.m. on August 15. She breathed spontaneously.

At the time of delivery the obstetrician (E. J. T.) noted that the anterior abdominal wall was absent, with eventration of the liver, stomach, spleen and small and large intestines. There was no evidence of any remnants of an ophalomesenteric sac or peritoneal covering of the exposed viscera. The umbilical cord was normal in appearance.

The infant's color was normal; her respirations were regular and not labored. No other defects were noted.

The infant was immediately placed in an incubator, with continuous oxygen. Warm saline compresses were applied over the extrophied organs.

When seen by the surgeon (J. H. T.) thirty minutes after delivery, the child appeared normal in all respects except for the aforementioned defects. The infant was also examined and evaluated by the Pediatric Service (Leo Grossman, M.D., and Harry Kaufman, M.D.).

The patient was prepared for operation by nasogastric intubation and aspiration of the stomach contents. A cutdown was effected in the left great saphenous vein at the ankle, and a polyethylene tube inserted. This was done in anticipation of prolonged intravenous therapy. The patient was typed and crossmatched for whole blood and was taken to the operating room approximately one hour after delivery.

Operative Observations.—The defect measured approximately 15 cm. in width and 18 cm. in length. It extended longitudinally from the xiphoid cartilage to approximately 5 cm. proximal to the pubis and laterally the entire width of the abdominal wall.

There was no evidence of rupture of an omphalomesenteric sac or of peritoneal remnants. The lateral parietal peritoneal layer was fused to the skin circumferentially. Total eventration and ectopia of the liver, the stomach, the spleen, and of all the small and large intestines was observed. There was no evidence of any omentum. The liver, gallbladder and appendix were easily demonstrable as to position and apparent normality (Fig. 2).

The wall of the small intestine appeared finely granular and somewhat thickened, probably owing to exposure to amniotic fluid prior to birth. The urinary bladder appeared normal, with no malposition or ectopia.

We realized that the exteriorized organs, both solid and hollow viscera, could not be

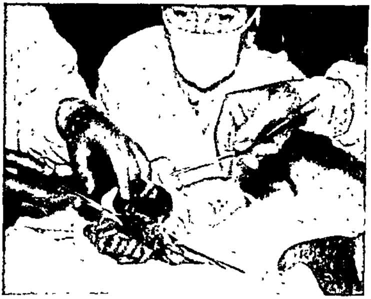

Fig. 2.—Hemostat on right pointing to undersurface of liver, stomach and spleen. Hemostat on left pointing to small globular gallbladder.

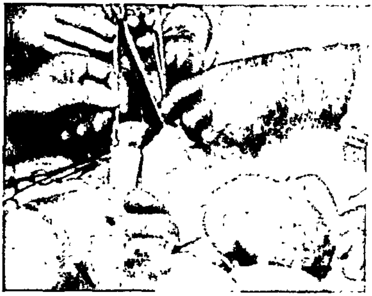

Fig. 3.—Hollow viscera replaced; left hepatic lobe visible at upper angle of wound.

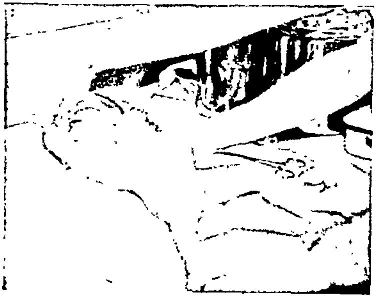

Fig. 4.—Immediately after closure. Note tension on lateral skin flaps.

replaced within the incompletely developed peritoneal cavity.

Procedure.—Open drop ether in minute doses, coupled with oxygen, was given as indicated for anesthesia. The skin was prepared with aqueous zephrin in 1:1,000 solution.

The exposed organs were irrigated with copious amounts of tepid physical solution of sodium chloride to remove the meconium that had contaminated the surfaces of the small bowel and other viscera.

The stump of the umbilical cord, which was attached to the left lateral edge of the defect, was dissected free of its vein and two arteries. These were individually ligated with No. 00 black silk.

The edges of the skin were clamped with Allis forceps circumferentially, and an attempt was made to identify any underlying fascia, muscle or peritoneum.

As the lateral dissection of the cutaneous edges progressed, it was apparent that there was total absence of the recti muscles, the recti fascia and the anterior portion of the external oblique muscles. No musculature, fascia or peritoneum was noted on either side until the dissection was carried widely to the lateral flanks, where remnants of the external oblique and transversus abdominis muscles were identified and observed to be markedly hypoplastic.

The dissection of skin was carried superiorly to the xiphoid cartilage. There was no evidence of any remnants of the recti. In the same manner, the dissection carried inferiorly to the symphysis pubis revealed no musculofascial remnants.

Fig. 5.—Moderate peripheral cyanosis of skin flaps.

It was obvious that the only method of closure possible was to effect complete mobilization of the skin surrounding the defect by wide dissection over both flanks to the lumbovertebral region and from the crest of the ilium to well over the costal margins.

When the extensive skin flaps had been fashioned, the edges of the skin were again grasped with Allis clamps and elevated. The viscera were replaced in the quasi-abdominal cavity thus formed (Fig. 3). They were then irrigated with 1,000,000 units of crystalline penicillin and 1 Gm. of dihydrostreptomycin in 20 cc. of physiologic solution of sodium chloride.

During the operation the nasogastric tube became plugged and was removed. Another nasogastric tube was reinserted prior to closure.

Closure: Since a subcutaneous closure was impossible, the cutaneous edges were freshened and approximated with interrupted mattress sutures of No. 32 wire under moderate tension.

After the suturing of the wound the skin was observed for fifteen minutes. There was no marked evidence of severe circulatory disturbance, although the extensive skin flaps appeared slightly cyanotic (Fig. 4).

A sterile aureomycin dressing was applied over the wound, and the patient left the operating room in good immediate postoperative condition. The total operating time was one and a quarter hours.

Postoperative Care.—Surgical: Postoperatively, the following complications were anticipated: respiratory and/or circulatory embarrassment due to the tremendous increase in intra-abdominal pressure, with encroachment on the diaphragm and inferior vena cava. Fortunately these were not encountered.

In the first twenty-four hours after the operation the child was placed in an incubator with a high concentration of continuous oxygen. Constant gastric suction was employed by means of a No. 8 French nasogastric tube. "Combiotic" (100,000 units of penicillin and 1/8 Gm. of dihydrostreptomycin) was administered intramuscularly every eight hours for six days. It was discontinued on the sixth postoperative day, and 50 mg. of Ilotycin Pediatric was given orally every eight hours until the twenty-first day.

Fifty cc. of whole blood was given slowly through the polyethylene cutdown after the surgical procedure. On the first and second postoperative days, 100 cc. of Ringer's molar lactate and 200 cc. of 2.5 per cent dextrose in distilled water were given intravenously daily.

The wound was first redressed on the sixth postoperative day. Moderate peripheral cyanosis of the skin flaps was present, but there was no evidence of superficial ulceration or necrosis (Fig. 5). The aureomycin dressing was reapplied.

The wound was redressed every three or four days until the thirty-second day of hospitalization, at which time alternate wire sutures were removed. Excellent wound healing was present. The remainder of the wire sutures were removed on the thirty-fifth day, and the patient was discharged on the thirty-ninth day in good condition (Fig. 6), weighing 7 pounds and 2 ounces (3,231.8 Gm.).

Nutritional Data.—On the second postoperative day the nasogastric tube was clamped, and oral feedings of 1 ounce of 5 per cent dextrose in distilled water every three hours were instituted. The oral feedings were well tolerated, and the nasogastric tube was removed on the third postoperative day.

Formula feedings of Alacta in 1:3 dilution were started after withdrawal of the nasogastric tube. The first formula feedings consisted of 2 ounces every three hours. This was supplemented by 100 cc. of 5 per cent dextrose in Lactate Ringer's solution, given intravenously. One hundred mg. of ascorbic acid and 10 mg. of Vitamin K were given intravenously daily until the eighth day, at which time one drop of Vi-Mix was added to the oral feedings. The Vi-Mix was increased by one drop each day until a total of ten drops a day was given.

The oral feedings were tolerated well. The Alacta mixture was progressively concentrated to a 1:2 ratio. On the twelfth postoperative day 2 ounces of Similac, 1:2 dilution, were given by mouth every three hours. One-half cc. of Ferrolip was added to the daily formula on the twenty-fourth day.

Two teaspoons of Pablum rice cereal in 1 ounce of formula was added to the oral feedings twice daily. This regimen was continued until the infant reached the age of 1 month. The Pablum was then increased to 2 teaspoons three times a day, and the Similac was increased to 1:1 dilution, three ounces of the Similac being given every three hours. This feeding regimen was continued until discharge from the hospital.

Course.—On the second postoperative day the patient had a transitory convulsion lasting one and one-half minutes. Ten cc. of 10 per cent calcium gluconate in 100 cc. of Lactate Ringer's solution was given intravenously. No other convulsive seizures or neurologic signs were noted throughout the hospital stay.

The temperature (rectal) fluctuated between 98 and 101.4 F. until the third postoperative day. It then became normal and remained so until discharge.

There was no gastrointestinal or respiratory difficulty at any time.

Follow-Up.—The infant was last seen on

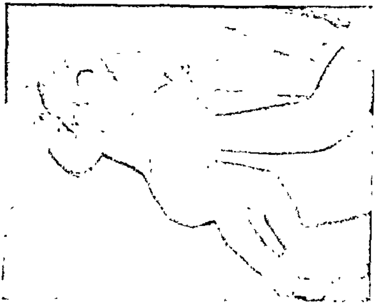

Fig. 6.—Wound on thirty-ninth postoperative day, well healed. Peristalsis was visible through overlying skin.

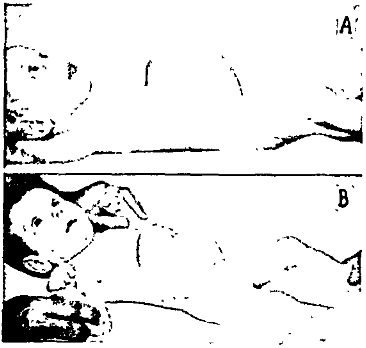

Fig. 7.—*Photographs taken on Oct.* [illegible] the age of 2 months, showing size [illegible] defect and adequate molding of skin underly

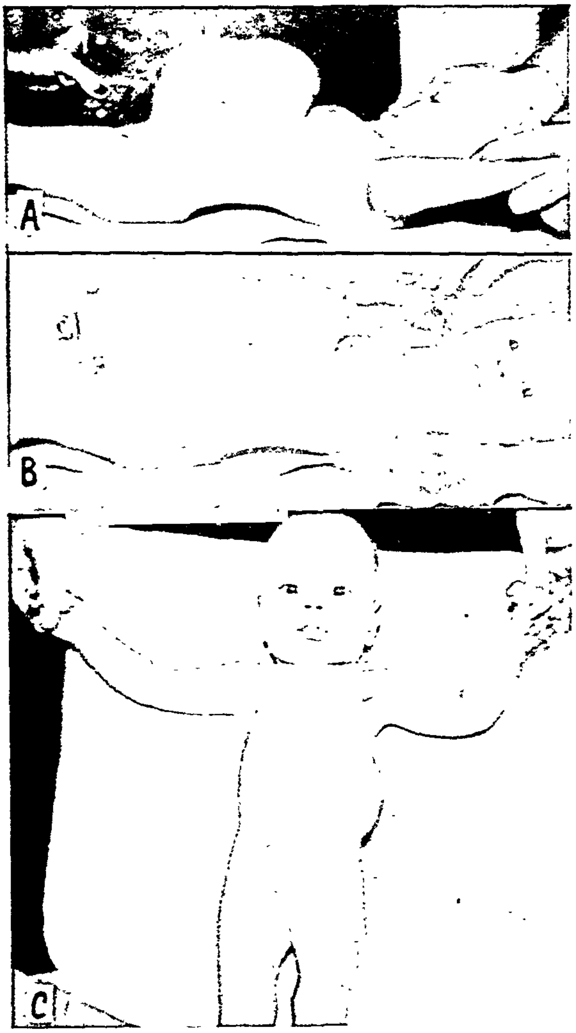

Fig. 8.—Photographs taken in February, 1955, five months after the operation.

Oct. 15, 1954. No abnormalities were noted, and normal physical development was progressing satisfactorily, with continued weight gain (Fig. 7, *A* and *B*).

Reevaluation of the patient's condition will be done periodically until systemic growth and development are adequate to determine the type of plastic procedure necessary to effect reconstruction of an anterior abdominal wall.

SUMMARY

The authors present a case of total agenesis of the anterior abdominal wall with eventration and ectopia of the liver, stomach, spleen and small and large intestines. This anomaly was coupled with complete absence of peritoneal or omphalomesenteric coverings.

The purpose of this paper is to describe a method of repair and treatment and to differentiate this condition from omphalocele and umbilical hernia. Omphalocele is a defect in which there is a wide separation of the fascia and recti muscles of the anterior wall, with a thin-walled peritoneal (amniotic membrane) covering exteriorized viscera. In cases of umbilical hernia the defect may be of varying size, involving the recti fascia and muscles in the periumbilical area, causing a bulge of peritoneum covered by skin alone.

An aggressive attitude on the part of the surgical and pediatric services may well salvage many newborn children with congenital anomalies that appear hopeless at first glance.

RÉSUMÉ

Les auteurs présentent un cas d'agénésie totale de la paroi abdominale antérieure avec éventration et ectopie du foie, de l'estomac, de la rate et des intestins. Cette anomalie était associée à l'absence complète de revêtement péritonéal ou omphalomésentérique.

Le but de cette publication est de décrire une méthode de réparation et de traitement et d'établir la différence entre cet état et l'omphalocèle ou la hernie ombilicale. L'omphalocèle est un défaut qui consiste en un large écartement des aponévroses et des muscles droits de la paroi antérieure, avec un viscère extériorisé couvert d'une fine membrane péritonéale (membrane amniotique). Dans les cas de hernie ombilicale, le défaut peut être de dimension variable, comprenant, dans l'aire périombilicale, les aponévroses et muscles droits avec bombement du péritoine recouvert seulement par la peau.

Une attitude interventionniste de la

part des services de chirurgie et de pédiatrie peut sauver bien des nouveau-nés ayant des anomalies congénitales paraissant à première vue sans espoir.

ZUSAMMENFASSUNG

Die Verfasser berichten über einen Fall *von völliger Aplasie der vorderen Bauch*wand mit Eviszerierung und Ektopie der Leber, des Magens, der Milz, des Dünndarms und des Dickdarms. Diese Anomalie ging mit völligem Fehlen einer peritonealen oder omphalomesenterischen Hülle einher.

Die Arbeit verfolgt den Zweck, eine Methode der Wiederherstellung und Behandlung zu beschreiben und auf die Unterschiede zwischen dieser Form der Erkrankung und einem Nabelbruch hinzuweisen. Unter Omphalozele versteht man einen Defekt, bei dem die Faszie und die Rektusmuskeln der vorderen Bauchwand einen weiten Spalt aufweisen, und die nach aussen verlagerten Eingeweide von einer dünnwandigen peritonealen Hulle (Amnion) bedeckt sind. In Fällen von umbilikaler Hernie kann der Defekt von verschieden grossem Umfang sein, er betrifft die Rektusmuskeln und deren Faszie in der Umgebung des Nabels und führt zu einer Vorwölbung des Bauchfells, das nur von Haut überlagert ist.

Eine entschlossene und furchtlose Haltung des Chirurgen und des Kinderarztes kann zur Rettung vieler mit angeborenen Anomalien zur Welt gekommenen Säuglinge, die auf den ersten Blick verloren zu sein scheinen, führen.

RIASSUNTO

Viene presentato un caso di agenesia completa della parete addominale anteriore con prolasso ed ectopia del fegato, dello stomaco, della milza e di tutto l'intestino.

L'anomalia era associata a mancanza della membrana peritoneale ed onfalomesenterica.

Scopo del lavoro è quello di descrivere un metodo di cura chirurgica per questa affezione e di insegnare a distinguerla dall'onfalocele e dall'ernia ombelicale.

L'onfalocele è dovuto a un'ampia separazione della fascia e dei muscoli retti, con un sottile rivestimento peritoneale (membrana amniotica) che ricopre i visceri esteriorizzati. Nell'ernia ombelicale il difetto può essere di dimensioni variabili, e interessa la fascia dei muscoli retti e dei muscoli della regione ombelicale, con conseguente protrusione del peritoneo rivestito dalla cute.

L'intervento chirurgico può salvare molti bambini in cui la lesio ne può sembrare ad una prima osservazione, incurabile.

SUMARIO

Os autores apresentam um caso de agenesia total da parede abdominal anterior com eventração e ectopia do fígado, estômago, baço, intestino delgado e grosso. À esta anomalia se adicionou ainda ausência completa dos revestimentos peritoniais e onfalomesentéricos.

O objetivo dêste artigo consiste em descrever um método de correção e tratamento desta afecção, bem como diferenciála da onfalocele e hérnia umbilical. A onfalocele é um defeito em que há uma ampla separação da fascia e músculos retos da parede anterior, com uma fina membrana peritonial (amniótica) cobrindo as vísceras exteriorizadas. Nos casos de hérnia umbilical o defeito pode ter tamanho variável, abrangendo as aponevroses e músculos retos na região periumbilical, provocando uma saliência peritonial coberta apenas por pele.

Uma orientação agressiva por parte dos serviços pediátricos e cirúrgicos pode salvar *muitos recém-nascidos com anomalias* congênitas que parecem sem esperança à primeira vista.

RESUMEN

Se presenta un caso de agenesia total de la pared abdominal anterior con eventración y ectopía hepática, gástirca, esplénica e intestinal. Esta anomalía se asoció con ausencia completa de cubierta peritoneal u onfalomesentérica.

El propósito de este artículo es describir un método de reconstrucción y tratamiento y diferenciar este parecimiento de la hernia umbilical y el onfalocele. Este último, es un defecto en el cual existe una amplia separación de la fascia y rectos de la pared anterior, con una delgada cubierta peritoneal sobre las vísceras exteriorizadas (membrana amniótica). En los casos de hernia umbilical el defecto varía de tamaño, complicando la fascia y músculos rectos del área periumbilical, produciendo una saliente peritoneal cubierta por piel. Una actitud agresiva de parte de los servicios pediátricos y quirúrgicos puede salvar muchos niños recién nacidos con anomalías congénitas que aparezcan a primera vista como sin esperanza.

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There is no one who cannot find a place for himself in our kind of world. Each of us has some unique capacity waiting for realization. Every person is valuable in his own existence—for himself alone. In our communities, in our circle of family and friends, each of us can bring to fruition these innate, God-given abilities.

—*Bender*

Incentives are spurs that goad a man to do what he doesn't particularly like, to get something he does particularly want. They are rewards he *voluntarily* strives for.

—*Hoffman*

Interstitial Cystitis

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THE purpose of this paper is to discuss the etiologic factors believed to be related to interstitial cystitis, to review my own observations on the disease and to comment on those of others as gleaned from my study of some 1,300 cases.

According to the *Standard Nomenclature of Diseases and Operations*, interstitial cystitis is a manifest structural reaction of the bladder due to an unknown or uncertain cause. A few investigators, however, have theories to offer as to its cause.

So far as a description of the clinical entity is concerned, I confess a partiality for Dr. Guy Hunner's original observations. Undesirable as eponymics may be, the term "Hunner ulcer" signifies a particular vesical lesion, whereas the attempt to coin a more descriptive name, e.g., interstitial cystitis, fails in specificity, since this term embraces a number of lesions that are similar to Hunner's ulcer but not identical with it.

Dr. Hunner encountered his first case of this lesion in 1908. The patient was a woman aged 54, highly nervous from loss of sleep due to frequent urination and constant vesical pain. The urine contained a rare leukocyte and a few erythrocytes. Pelvic examination revealed several small uterine fibroids. A complete urologic examination, including guinea pig tests for tuberculosis, failed to disclose any abnormalities of the urinary tract. Hunner assumed that the vesical symptoms were directly referable to the fibroids. Accordingly, a supravaginal hysteromyomectomy was carried out. The patient's symptoms, however, did not subside. Cystoscopic examination was repeated a few months later, under more satisfactory anesthesia than had been obtained at the original examination, and a tiny, brilliantly red, apparently superficial ulcerated area in the vertex of the bladder was noted. This area, measuring about 3 to 4 mm. in diameter, was treated with a 10 per cent solution of silver nitrate. Remarkable temporary relief of symptoms was obtained. Dr. Hunner observed the patient during a follow-up period of twenty years, and, although her clinical symptoms were greatly relieved and she considered herself well, he noted a persistence of reduced vesical capacity.

Hunner's account of this case has constituted the classic clinical picture of the disease: suprapubic vesical pain, frequency of urination, nocturia, nervousness and reduced capacity of the bladder; the urine clear of microorganisms and with minimal abnormal cellular elements; the urinary tract normal with exception of the lesion in the dome of the bladder.

It was not until 1915, however, that Hunner published his description of this entity. By that time he had observed 8 cases. Subsequently he operated on several of the patients. He was impressed to note that the inflammatory processes extended through the wall of the bladder and involved the peritoneum. The actual lesions were located in the mobile portion of the bladder, chiefly the dome. In all instances the urine and the tissues were

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Read at the Nineteenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 6-10, 1954.
Submitted for publication Oct. 6, 1954.

free of microorganisms, as was proved by bacteriologic studies. The pathologic process was localized panmural fibrosis that included the peritoneum reflected over the involved portion of the bladder; a degree of edema extended well beyond the ulcerated and fibrotic tissues. The ulcer was defined as a typical trophic lesion within an area of fibrous tissue replacing normal muscle bundles.

In searching for the cause of Hunner's ulcer, one finds the problem complex. The arterial, venous and lymphatic supply must be considered in an attempt to explain fibrosis in an organ such as the bladder (Fig. 1). It was Dr. Frank Hinman Sr. who suggested to me originally that this lesion might stem from an anatomic cause. The histories of the patients might be expected to reveal some clue. The collected data in approximately 1,300 cases indicate that the disease occurs almost exclusively in the female and within definite age brackets, that the lesion is almost invariably situated in the mobile portion of the bladder and that the incidence of associated pelvic lesions is remarkable.

More than 60 per cent of my present series of patients with Hunner's ulcer have had uterine fibroids. The incidence of fibroids in women has been estimated by Curtis as 20 per cent. The observation that uterine myomas are present three times as often in patients with Hunner's ulcer as in the general female population of the same age group is therefore statistically significant. Curtis has pointed out that uterine myomas are accompanied by obstruction to the lymphatic drainage of the uterus, which raises an interesting point in relation to the cause of Hunner's ulcer. In his opinion there is an intimate relation between menstruation and the development of myomas and that a disturbed balance of ovarian hormones is involved. Disturbance of lymphatic drainage has been related to these tumors by Graves also, who stated that fibrosis occurs and lymphatic cysts frequently are encountered when lymphatic drainage is impaired. In view of the close interrelation of the uterine and vesical lymphatic drainage, it is entirely plausible that the cause of fibrosis of the bladder may be related to fibromyoma of the uterus. The frequent association of the two lesions certainly lends weight to this theory.

Not all patients with Hunner's ulcer have fibroids; but among the exceptions there is another large group in whom disturbance of lymphatic drainage is present, i.e., patients whose histories include surgical or irradiation therapy for various pelvic lesions. The tendency to pelvic edema in the woman approaching the menopause, regardless of the presence or absence of pathologic change, has significance in view of the established age brackets of patients with Hunner's ulcer. Because of this highly protein edema of the vesical wall considerable fibrosis may be expected to occur. In some instances the vascular channels are disturbed also, to the extent that relative anemia occurs in these edematous and subsequently fibrotic areas.

On the basis of the factors just cited, the mechanism involved in the production of Hunner's ulcer might be postulated as follows: (1) the presence of a highly protein edema of the vesical wall, leading to considerable fibrosis; (2) disturbance of the vascular channels, giving rise to relative anemia in the edematous and subsequently fibrotic areas; (3) eventual fixation and contraction of the fibrotic areas, resulting in a trophic lesion and a manifest ulcer; and (4) exposure of nerve fibrils and development of a reflex arch so that the detrussor becomes spastic and pain is experienced. I have become convinced, however, that regardless of vascular disturbance occurring as a result of pelvic disease or surgical procedures, the more basic disturbance lies in th[illegible] lymphatic drainage. Several years ago I investigated the subject of chronic ly[illegible] edema experimentally. I was famili[illegible] Drinker's experiment in wh[illegible] phatics of the dog's leg were [illegible] ducing pronounced fibrosis [illegible] operation on the dog I was [illegible] barrass the blood supply to [illegible] For the most part, even [illegible] stasis was pronounced, th[illegible] would handle the extracellu[illegible] but little edema and subse[illegible] occurred. When the lymph[illegible] blocked, however, in the p[illegible] venous stasis, the fibrogen[illegible] became accentuated and [illegible] ulcerated areas finally occurred.

The foregoing discussion [illegible] deals specifically with true, [illegible] ner's ulcer rather than the wh[illegible] interstitial cystitis. The wider sc[illegible] the latter term is appreciated when the cases reported in the literature under this title are reviewed: One surgeon of wide experience has stated that in 25 per cent of his cases the patients are men and the condition often follows transurethral resection. Another, reviewing his own series of cases, chose to discard, as a result of re-study and follow-up of the patients, one-third of those previously classed by him as cases of interstitial cystitis. One author reported that most of the lesions observed by him were in the floor of the bladder and most often existed in association with infection and/or other abnormalities of the urinary tract. A difference of interpretation of the term "interstitial cystitis" seems evident when one considers that a fairly young urologist has reported observing approximately 300 cases of interstitial cystitis, whereas a renowned professor of urology in a prominent university has expressed the opinion that less than a hundred cases in his experience can be so classified. Such widely differing views may be attributable, in part, to the realization that a large variety of inflammatory lesions may, in fact, become interstitial; tuberculous cystitis, for instance, is interstitial. About one-third of the approximately 1,200 reports of cases of interstitial cystitis which I have reviewed fall short of describing the classic Hunner ulcer.

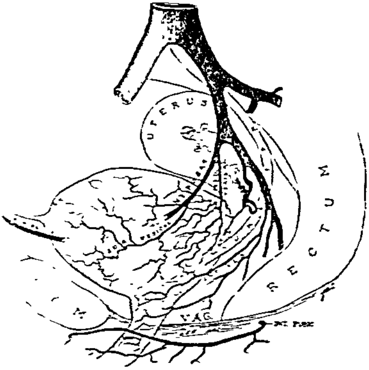

Fig. 1.—Diagrammatic sketch of blood supply of the bladder in relation to the uterus.

At one time I studied vesical tissue sections from autopsy material and, on the basis of microscopic evidence of interstitial inflammatory observations, found a high incidence of mild "interstitial cystitis"; however, the clinical and symptomatic histories could not be correlated therewith—in fact, the highest incidence of this microscopic pathologic process was in elderly men.

My opinion is that Hunner's ulcer is elusive; it is an uncomplicated, clinically unexplainable, uninfected lesion that is often missed on cystoscopic examination. Usually it involves the mobile portion of the bladder and in the majority of instances occurs in the dome. It is extremely rare in men. O[illegible] e i[illegible] ries

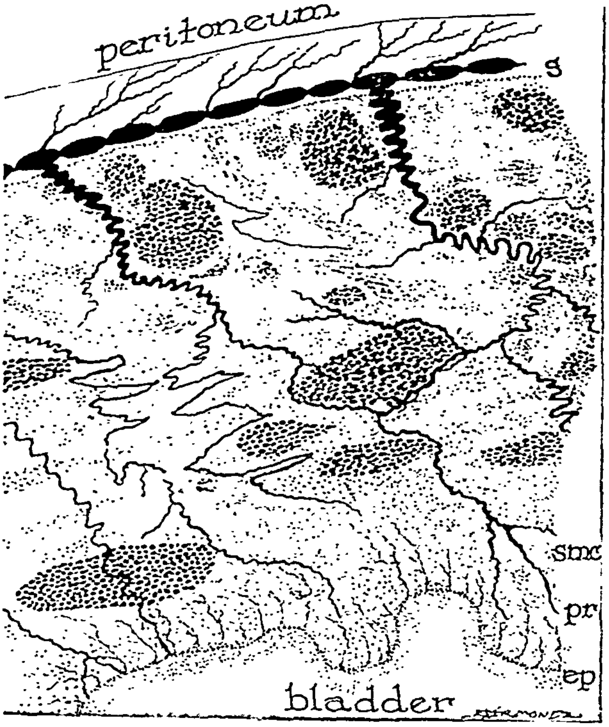

Fig. 3.—Diagrammatic drawing of normal anterior bladder wall, illustrating lymph vessels.

of 100 cases have I observed the typical lesion in a male patient. In this instance, it occurred in a middle-aged man during an acute flare-up of psoriasis. In my experience infection is completely out of the etiologic picture. This does not mean that infection could not have been introduced instrumentally by accident, but such infection certainly would be easy to clear and should not seriously confuse the diagnosis.

Other types of nonspecific interstitial cystitis should not, in my opinion, be confused with Hunner's ulcer. Examples are (1) that which occurs after operation on the prostate and the neck of the bladder, (2) that associated with pronounced lesions of the upper part of the urinary tract complicated by chronic infection and (3) that associated with severe infections of the lower part of the urinary tract and/or genital tract. But such lesions are usually located on the floor and the lateral walls, although they may be diffuse and may even occur in a form cystoscopically resembling the classic picture of Hunner's ulcer. Often overdistention will cause them to bleed. Sometimes subacute cystitis may at first be thought to be of the elusive type, but time will always clarify the diagnosis. In some of these other forms of interstitial cystitis the bladder may become extremely fibrotic; the treatment I employ for Hunner's ulcer might, in some instances, be helpful—once infection, if present, is cleared. But the etiologic factors that are involved in true Hunner's ulcer, in my opinion, do not apply to other types of interstitial cystitis.

Two unusual cases in which Hunner's ulcer was present have recently come under my observation. Both patients, women, had had typical Hunner's ulcer of long duration. They had been seen by a number of urologists throughout the country, and there was no question as to the diagnosis. In each instance the lesion was small and near the dome. Both patients were under excellent clinical control until an acute flare-up developed and the entire bladder appeared to have become involved. The area around the neck of the bladder was edematous and extremely red. The urine remained clear, with this exception: My associate, Dr. H. H. Edelbrock, noted large, bizarre, epithelial cells. This was the first time we had observed such cells in the urine, and we wondered what their significance might be, the possibility of malignant change being uppermost in our minds. The symptoms became unbearable.

In 1 case transurethral resection was carried out and biopsy specimens taken from the sites of old lesions. All specimens were typical of interstitial cystitis. Repeated cystoscopic procedures finally revealed, anterior to the vesical neck about halfway between the urethra and the previous site of an old ulcer, a small, sessile lesion; biopsy of this proved it to be an epidermoid carcinoma. Total cystectomy with bilateral ureterointestinal anastomosis was carried out. There were no palpable glands. At the time of writing it is too early to tell the outcome. This is the only patient with intertstitial cystitis in whose case I have considered it necessary to carry out such a procedure.

In the other case we became immediately suspicious as soon as the clinical episode occurred. The urine revealed the large, peculiar epithelial cells to which reference has already been made. The treatment that had previously given relief to this patient now completely failed. We again deliberately took biopsy specimens from several areas; all gave negative results for malignant change. However, the large epithelial cells in the urine persisted. Finally a small mass developed at the exact site from which one of the biopsy specimens had been taken. This woman was older than the other—approximately 75 years of age. She did not wish to undergo a radical operation, and we did not insist on it. She lived a year and a half with an indwelling catheter. For the most part she was fairly comfortable.

I should hesitate to jump to the conclusion that Hunner's ulcers had become malignant. It might be more accurate to say that the malignant lesion developed in a bladder that had already been involved for many years with interstitial cystitis. It is possible that the two lesions were entirely unrelated.

Treatment.—One of the most important elements in the overall management of this distressing lesion is gaining the patient's confidence. The subject usually is a

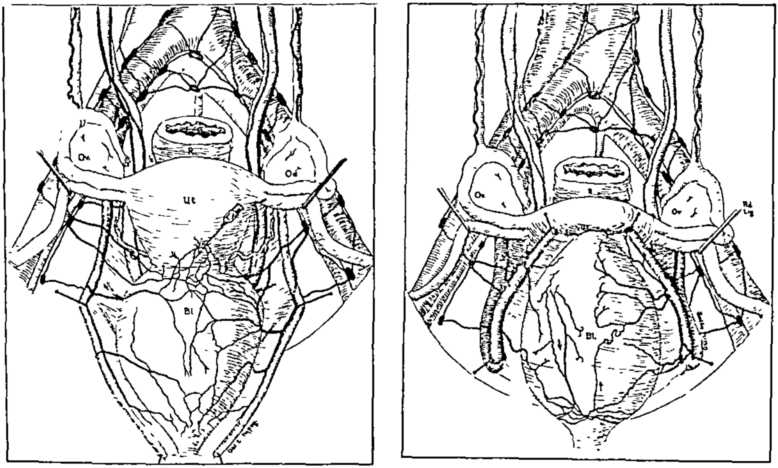

Fig. 2.—*Left*, composite semidiagrammatic sketch of the lymph collectors and nodes in relation to the uterine, vaginal and hypogastric vessels as well as the ureter and cervix of the uterus. (Powell: Surg., Gynec. & Obst., June 1944). *Right*, usual location of main lymph collectors of anterior [illegible] wall represented on right of diagram. Important variation in course represented on left. Surg., Gynec. & Obst., June 1944).

middle-aged woman, extremely nervous, who has already tried a great variety of remedies and often has consulted a number of doctors. Her sleep has been disturbed over a long period, and she often has a phobia of cancer. She must be given a good insight into her problem: The nature of the lesion and the purpose of the treatment must be explained to her. This will require considerable patience and time but will insure cooperation and the best possible results whatever therapy may be chosen.

After the emotional problem has been handled, the general physical condition of the patient must be considered. All infections should be cleared. The mouth and other focal areas must be investigated for the presence of possible chronic low grade infection. Allergic factors, particularly those related to foods, should be considered. Hormonal balance must be assured. In patients in whom this factor requires attention, I usually start with testosterone and later change to Test-estrin by oral absorption. As a rule I do not use estrogenic material for this purpose. Some patients are given thiamine chloride by mouth in moderate doses, as well as alpha tocopherol, with the hope of diminishing the threshold of pain. Some of the extremely uncomfortable patients are given cortisone at the outset; in some instances this gives a great deal of immediate relief. A mild sedative often is helpful.

A most important part of treatment for Hunner's ulcer is irrigation of the bladder and gradual distention, with use of a solution of silver nitrate. I use a very weak solution at first, usually 1:2,000, and increase the strength gradually to 1:100. I see the patient weekly if possible.

If the lesion does not respond to this treatment within a short time, I apply mild desiccating Oudin current, introducing the electrode through the cystoscope with the patient under mild anesthesia, such as that induced by a narcotic administered hypodermically and Trilene inhalation. I never try to force a great degree of distention, any more than I would attempt to dilate a urethral stricture to its maximum size in a single treatment. Gentle and gradually increasing dilations and progressive concentration of solutions have been the keys to the irrigation therapy.

Only occasionally have I found that this therapeutic program must be supplemented by other measures, as in the instance of a patient who lives at a distance that precludes regular weekly treatments. In 2 such cases the lesions were localized to the dome, leaving a considerable portion of the bladder completely free. Subtotal cystectomy was followed by remarkable abatement of symptoms in both patients. In my opinion this is an excellent procedure to keep in mind for patients who fall in this category. In another patient there was, in addition, some evidence of involvement of the lateral walls, arching lateralward over to the neck of the bladder. Although subtotal cystectomy was followed by reduction of pain and discomfort in this instance also, the symptoms recurred in about a year, and it was discovered that another large lesion had developed on the posterior wall of the bladder.

My colleague, R. T. Bergman, working with a neurosurgeon, has approached the problem in a small group of cases of more serious involvement by efforts to denervate the extrinsic parasympathetic elements surrounding the bladder. He has indicated that a great deal of relief has been obtained. A similar approach to therapy has been employed in a number of European clinics.

The great majority of these lesions, according to my own experience, can be successfully arrested to the extent that the patients become quite comfortable. Some call me at periodic intervals. Some have periodic flare-ups. Then there are those who fail to grasp the problem involved and persist in seeking a quick, permanent cure; they may go from one doctor to another, and each one consulted may think that he has cured her, since she does not return.

It has not been necessary to carry out chordotomy in any of my patients. Inquiry reveals that some physicians who previously employed this procedure have abandoned its use. I am of the opinion that subtotal cystectomy (not segmental resection) should be done in a greater number of patients with this lesion than is currently the practice. My more recent experience with this procedure has been most gratifying.

SUMMARY

Interstitial cystitis, from the pathologic point of view, does not necessarily indicate the clinical lesion known as Hunner's ulcer.

Studies of pelvic anatomy lend support to the theory that circulatory imbalance, especially impaired lymphatic drainage, is of high significance, etiologically, to Hunner's ulcer. Statistical data based on all reported cases substantiate the theory that pelvic lesions, particularly hysteromyomas, and pelvic surgical procedures are also causative factors. Histopathologic studies of myomas of the uterus reveal lymphatic blockage, lymphatic edema, lymphatic cysts, and fibrosis of the uterus and adjacent structures. Experimental investigations in the dog have established the fact that fibrosis of organs inevitably occurs when the lymphatic circulation of adjacent tissues is obstructed.

The pathologic process of Hunner's elusive ulcer is progressive: edema, fibrosis, vascular anemia, trophic ulcer with reflex nerve involvement, spasm of the detrussor and associated pain—usually at the site of the ulcer but occasionally referred reflexly along the course of adjacent extrinsic nerves. The presence of the original edema of the bladder, however, does not necessarily indicate that the trophic lesion will eventually develop.

Interstitial cystitis of a type differing from Hunner's ulcer may occur, particularly in men who have undergone surgical procedures at the neck of the bladder, or in patients with various pathologic urinary abnormalities and inflammations. This type has an etiologic basis differing from that of Hunner's ulcer.

Successful treatment for Hunner's ulcer requires that the patient acquire understanding of the problem and have complete confidence in the physician. The physician must approach the total distress of the patient, emotional as well as physical, if maximum results of specific treatment are to be attained.

Gradual vesical distention with solutions of silver nitrate, with, perhaps, the addition of mild cystoscopic desiccation of the individual lesions, may either relieve or minimize the majority of the symptoms. In an occasional instance such conservative measures may fail; in these cases, if the lesions are on the posterior wall or the dome of the bladder, subtotal cystectomy should be considered.

Two cases are reported of Hunner's ulcer of long standing, in which a malignant lesion of the bladder finally developed. It could not be determined whether the Hunner ulcer had become malignant or whether the cancerous lesion was entirely unrelated to the ulcer, but the latter possibility seems the more likely.

ZUSAMMENFASSUNG

Vom Standpunkte der Pathologie ist die interstitielle Harnblasenentzündung nicht unbedingt gleichbedeutend mit dem Vorliegen der klinischen Erkrankung, die unter dem Namen des Hunnerschen Geschwürs bekannt ist.

Anatomische Untersuchungen des Beckens haben zur Unterstützung der Theorie geführt, dass ätiologisch Kreislauförungen, besonders Behinderungen des Lymphabflusses, beim Hunnerschen Geschwür eine höchst bedeutende Rolle spielen. Statistische Untersuchungen aller bekannten Fälle bekräftigen die Auffassung, dass Beckenerkrankungen, besonders Myome der Gebärmutter, und chirurgische Eingriffe am Becken ebenfalls ursächliche Faktoren darstellen. Histopathologische Untersuchungen von Gebärmuttermyomen zeigen Lymphverstopfungen, Lymphödeme, Lymphzysten und Fibrose der Gebärmutter und der anliegenden Gebilde. Versuche am Hunde haben nachgewiesen, dass es unfehlbar zur Fibrose von Organen kommt, wenn der Lymphkreislauf des benachbarten Gewebes verstopft ist.

Der pathologische Vorgang beim flüchtigen Hunnerschen Geschwür entwickelt sich fortschrittlich in folgender Weise: Ödem, Fibrose, Blutgefässleere, trophisches Geschwür mit Schmerzen, die gewöhnlich an der Stelle des Geschwürs lokalisiert sind, gelegentlich aber reflektorisch auf dem Wege benachbarter ausserhalb des Geschwürs liegender Nerven fortgeleitet werden. Das Bestehen des ursprünglichen Blasenödems bedeutet jedoch nicht, dass es unbedingt zur Entwicklung der trophischen Erkrankung kommen muss.

Eine interstitielle Blasenentzündung, die vom Hunnerschen Geschwür zu unterscheiden ist, kann besonders bei Männern, die einen chirurgischen Eingriff am Blasenhals durchgemacht haben, oder bei Kranken mit verschiedenen Anomalien und Entzündungen der Harnorgane auftreten. Diese Form der Erkrankung beruht auf anderen ätiologischen Grundlagen als das Hunnersche Geschwür.

Voraussetzung für eine erfolgreiche Behandlung des Hunnerschen Geschwürs ist, dass der Kranke Verständnis des vorliegenden Problems erwirbt und volles Vertrauen in den behandelnden Arzt hat. Zur Erzielung bestmöglicher Ergebnisse der spezifischen Behandlung ist es unerlässlich, dass der Arzt sich der Gesamtheit der seelischen und körperlichen Beschwerden des Kranken annimmt.

Die Mehrzahl der Symptome lässt sich durch allmähliche Blasendehnung mit Silbernitratlösungen und eventuell mit zusätzlicher milder Austrocknung der einzelnen Krankheitsprozesse auf zystoskopischem Wege beseitigen oder auf ein Mindestmass herabsetzen. Gelegentlich können solche konservativen Massnahmen versagen; in solchen Fällen sollte, wenn die Krankheitsherde an der hinteren Blasenwand oder am Blasendach liegen, die subtotale Blasenresektion in Erwägung gezogen werden.

Es wird über zwei Fälle von lange bestehendem Hunnerschen Geschwür, bei denen es schliesslich zur Entwicklung einer bösartigen Blasenerkrankung kam, berichtet. Es liess sich nicht feststellen, ob eine bösartige Entartung des Hunnerschen Geschwürs vorlag, oder ob die Krebserkrankung vom Geschwür völlig unabhängig war; die letztere Möglichkeit scheint jedoch die grössere Wahrscheinlichkeit für sich zu haben.

RÉSUMÉ

Cystite interstitielle, dupoint de vue pathologique, ne désigne pas nécessairement la lésion clinique connue sous le nom d'ulcère de Hunner.

La théorie d'un déséquilibre circulatoire, spécialement du drainage lymphatique déficient, se base sur des études d'anatomie pelvienne et a une signification importante quant à l'étiologie de l'ulcère de Hunner. Des données statistiques établies d'après tous les cas signalés étayent la théorie suivant laquelle les lésions pelviennes, particulièrement les my-

omes utérins et les opérations chirurgicales pelviennes, sont aussi des facteurs étiologiques. Das études histopathologiques des myomes de l'utérus révèlent blocage, oedème et kystes lymphatiques avec fibrose de l'utérus et des tissus contigus. Des recherches expérimentales sur le chien ont établi le fait que la fibrose des organes survient inévitablement quand la circulation lymphatique des tissus contigus est entravée.

Le processus pathologique de u'ulcère de Hunner est progressif: oedème, fibrose, anémie vasculaire, ulcère trophique, douleur située habituellement à l'endroit de l'ulcère, mais occasionnellement rapportée par voie réflexe le long du trajet des nerfs extrinsèques contigus. La présence de l'oedème origin nel de la vessie, cependant, n'indique pas nécessairement que la lésion trophique se développera le cas échéant.

Une cystite interstitielle, d'un type différent de celui de l'ulcère de Hunner, peut survenir surtout chez les hommes qui ont subi des opérations chirurgicales au col de la vessie, ou chez les malades ayant différentes anomalies et inflammations urinaires pathologiques. La base étiologique de ce type diffère de celle de l'ulcère de Hunner.

Le traitement efficace de l'ulcère de Hunner exige que le patient acuière la compréhension du problème et ait confiance au médecin. S'il veut obtenir les résultats maxima du traitement spécifique, le médecin doit comprendre la détresse totale du malade, du point de vue émotionnel aussi bien que physique.

Les symptômes peuvent être en majorité soit soulagés soit diminués par une distension vésicale progressive, au moyen de solutions de nitrate d'argent, accompagnée éventuellement d'une cautérisation ménagée, de chacune des lésions, par voie cystoscopique. Par occasion de telles mesures conservatrices peuvent manquer leur but; dans ces cas on devra envisager la cystectomie subtotale si les lésions sont sur la paroi postérieure ou le dôme de la vessie.

Deux cas sont signalés d'ulcères de Hunner anciens où une lésion maligne de la vessie se développa finalement. Il n'a pu être déterminé si l'ulcère de Hunner est devenu malin ou si la lésion était entièrement étrangère à l'ulcère, mais la dernière possibilité paraît la plus probable.

RIASSUNTO

La cistite interstiziale, dal punto di vista anatomo-patologico, non si identifica necessariamente con quella lesione che, clinicamente, è conosciuta sotto il nome di ulcera di Hunner. Gli studi condotti sull'anatomia degli organi pelvici appoggiano la teoria che le alterazioni circolatorie, specie gli ostacoli al circolo linfatico, rivesta no molta importanza nell'etiopatogenesi dell'ulcera di Hunner. Dati statistici ricavati da tutti i casi riferiti nella Letteratura appoggiano inoltre la teoria che le malattie degli organi pelvici, specie i fibromiomi dell'utero, e gli interventi praticati su tale regione abbiano anch'essi importanza dal punto di vista etiopatogenetico. Studi istologici dei fibromiomi dell'utero permettono di mettere in evidenza, a carico dell'utero e delle strutture adiacenti, alterazioni linfatiche consistenti in blocco del circolo, edema e cisti. Studi sperimentali su cani hanno inoltre permesso di stabilire che, se si occlude il circolo linfatico dei tessuti adiacenti, ne segue fibrosi degli organi.

L'ulcera di Hunner ha un decorso progressivo: edema, fibrosi, anemia, ulcera trofica e dolore, avvertito di solito in corrispondenza della sede stessa dell'ulcera, ma riferito talvolta lungo il decorso dei nervi estrinseci. La presenza in vescica dell'edema originario non stà sempre a indicare, tuttavia, che l'ulcera si svilupperà immancabilmente.